

# DRAGON USER



The independent Dragon magazine

March 1988

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December competition.

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You ask the questions, you answer.

## Editorial

If this Dragon User is late, then I'm an  
idiot, if it is on time, then I missed my  
plane, and if it's very, very late, then I'm  
hopeless somewhere in the Alps, hope-  
fully suffering nothing worse than an over-  
dose of spaghetti.

But seriously, there is a degree of con-  
trolled lateness here in an attempt to  
avoid the uncontrolled lateness which  
decended last time the staff took a week  
off. Don't blame the Postie (ill March).

The Postie may be to blame for the fact  
that we haven't got our issue's Dreams  
yet. Roy is looking into it.

The Cardiff Airport Dragon show has  
been dogged by confusion, but it today is  
earlier than 27th Feb, there's still time to  
pack your bags and go. The enquiries  
number is on page 21.

This month we have a program to read  
PC (MS/DOS) disks onto Dragon drives, a  
report from the 8th 6800 Show, a hard-  
ware inventory, and all the regulars.

Even the Classified ads.

### Dragon Answers 28

You ask the questions, we answer: NO as-  
sist, GET insert error, adding a RAM  
extension.

### STOP PRESS - STOP PRESS - STOP PRESS

Just in case we're late ... the Cardiff Airport  
Dragon Show really is on February 27th.

### How to submit articles

The quality of the material we can publish in  
Dragon User each month will, for very good  
reason, depend on the quality of the submissions that  
you can make with your Dragon. This Dragon  
computer was launched on to the market with a  
powerful version of Basic, but with very poor  
documentation.

Articles which are submitted to Dragon User  
for publication should not be more than 3000  
words long. All submissions should be typed  
(please leave wide margins and a double space  
between each line. Programs should, where  
possible, be computer printed on plain white  
paper and be accompanied by a tape of the  
program).

We cannot guarantee to return every sub-  
mitted article or program, so please keep a copy if  
you want to have your program returned; you must  
include a stamped addressed envelope.

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(All departments)  
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# Letters

This is your chance to air your views — send your tips, compliments and complaints to Letters Page, Dragon User, 12-13 Little Newport Street, London WC2H 7PP.

## Space buggy

CONTRARY to popular belief, the 1.3 version of *Star Wars* is far from buggy. These whippersnappers who get stuck with the game can contact me anytime on Great Missenden (03404) 2532. The first zero is not necessary when calling from overseas. There is an interesting machine at my end so just hang in.

Julian Brown  
Lancaster Cottage  
Lancaster Lane  
Preston  
Bucks  
HP10 0PY

## Write to Pam

I AM still interested in procuring software for the Dragon but am unsure as to what direction to take. Are there many more Dragon 32A cassette drives than disc users? Are there many more multiple drive rather than single disc drive users? There are often requests for more space to be made of the 64's greater memory, but how many 64 or 32 users are there? Dragon User has never clarified the user survey, that other magazines feature from time to time. Readers would care to drop me a line detailing their current configurations and software usage, not only will it help me enormously in my continuing support of the Dragon, but I will summarise the results (even if only one person replies) for readers. It would also be of interest to know how many Dragon users who do not subscribe to Dragon User that readers know of.

Pam O'Leary  
21 Wycombe Lane  
Middum Green  
High Wycombe  
Bucks  
HP10 0HD

Every month we will be shelling out a game or two, courtesy of our suppliers, to the reader/s who send the most interesting or entertaining letters. So send us your hints and your opinions, send us your hi-scores and suggestions. Send us your best Dragon stories. What if you think we are, *minimal readers?*



## Professional advice

THROUGH the pages of DU, I know that quite a few of you are interested in the Dragon Professional computer. Well, quite recently I wrote GEC to find out more about the Professional, and here is a reproduction of the letter they wrote back.

Dear Mr. Lindsay

"Thank you for your letter regarding Dragon computers." Unfortunately, we cannot help you with any information of the Dragon Professional, as we have only distributed the Dragon 32 and 64 models. We have not heard of the Professional version, and therefore we can only suggest that you contact Dragon User to investigate whether any of its readers have encountered this model. We can only assume that the model may have been made in small numbers as an unmarket prototype just before Dragon Data ceased trading.

I am sorry we cannot be of more assistance in this matter. Yours sincerely, S. McManus, Service Technical Department. Well, GEC weren't very helpful, but how come GEC haven't heard of the Professional, when a few years back DU printed a picture of the Professional which had the GEC logo on the top of the machine?

David Lindsay 12 Green Way South Poles,  
Chesham Street, Chesham CH1 2JH

ALL true, all true. By the same token one might wonder if Dragon User published that picture, how come they don't know about the Dragon Professional? But we don't. We have tried to get information before, I think that GEC are right, and that somebody worked on the Professional shortly before Dragon Data packed up. Someone had told me, two years ago, that they had seen a Professional running. I would suspect the picture was of an advance prototype, in a mock-up. It may have been so. It looks as though somebody at GEC did look into this, but once a project has been shelved and a few staff changes have taken place, it is almost impossible to find people who know what happened.

One thing is certain — there is no Dragon Professional on the market. But many thanks to Mr. Lindsay for his effort.

THERE are many reasons why Dragon User has not run a survey in recent years, most of them to do with the only source of editorial copywriting rushed off her feet, but some to do with the office administrator being rushed off her feet. Plus the

fact that we get lots of opinionated letters (keep them coming), but since Pam has not only suggested one but offered to administer it — we suggest you write to Pam and tell her your thoughts. She is a primary source of Dragon software.

## Where's the chip?

IN the October 1987 edition of DU there was an article called *Better video*. This talked about the out of date 68026418, and the up-to-date 68027550, which would give us better graphics and unlimited colours.

What I didn't say was where you can get the 68027550 chip from, and when you have, how to install it in the Dragon.

Duncan Chambers  
30 Park Avenue  
South Sirenia  
Surrey and Here  
NE1M 8QZ

## Routine righted

THANK you for printing my letter and program in the January 1988 issue (*Change righted*). However, during the printing process some errors have been introduced. An apostrophe is missing before RIGHT in line 108. Line 160 should read IF PY = L THEN ... The variable is PG5 in line 210. An open bracket is missing after M33 in line 230. Line 260 should read IF PAGE5 = M5 THEN M5 = M4 + STRM405. In line 270 (forward) should of course be STRM405 and the GOTO 220 should in fact be a GOTO 228. Well, that's the lot. How is it that so many mistakes can appear in such a small program? On yet One final thing — perhaps you could have appended my name if not to sell satisfaction then at least readers would know who to complain to.

Happy New Year

Roger Mason  
29 Colwyn Close  
Rowley Regis  
Warley  
W Midlands B65 8SU

MISSING — and — is usually named somebody but the original letter before proof-reading stage. Missing names tend to confirm this deduction. The fact that we can't find the letter just about sums it up. — Sherlock Sub.

I have seen the High Score corner in two issues of DU, so here are some of mine:

Shaqin Master — 108,200  
Chuckie Egg — 183,040

level 18  
Speed Racer — 40 rules,  
64,720  
Shocktrooper — 52,260

I've been reading DU for two years, keep up the good work.

RICK CARR  
88 Hale Lane  
Mid Hill, London SE20 2PT

Um, oh. We just opened the can of worms again...

I was reading September's high scores for Chuckie Egg and none of them are as high as the score my brother reached a couple of years ago. I don't remember the exact score, but it was just short of 750,000 in I think level 30.

Jeff Boop  
48 Camford Street,  
Dunblun,  
West Herts AL7 1TE

# Hi-score corner again . . .

I am fed up with looking at those pathetic high scores for Chuckie Egg. I am the champion, and that is final. I enclose a photograph of my second highest score of 916,476. I once topped my million, but had no time in my career at the time.

I am a 38 year old mother of 4. I am a Dragon user who has now replaced my Chuckie Egg from me, so that I have more time for cooking, cleaning etc.

Mrs. Sheila Roberts (Bassie)  
Hill Cottage  
30 Oakley Lane  
Wimborne  
Dorset  
BH21 3AH

Don't let those two Bassie heads into Bassie. They finished a cookbook and yourself a copy of Total Eclipse. And now, for the entertainment of champions everywhere...

I think I can claim to be Chuckie Egg master! I have had many times well over a million points — my record being just under 1,400,000 (level 39). As anyone else who may have got this far will know, this score is usually irrelevant as I could easily beat it if I had enough time. After level 32, the game keeps back to what was called level 25 (only it is now level 33). So it is possible to play for hours. My longest game lasted about 32 hours. But boredom takes over after the first couple of hours!

Andrew Lamb  
2 Marsham Road  
Rushmore  
Surrey GU24 0AF  
Chester SK7 5UR

PS Are there any 6800 chips planned for around Manchester in the future?

Robbie's oblige...

I was very humoured at the high scores people sent into high score corner. Paul's sister will have to struggle me because I got 6,750,000 and I had to kill all my lives because it was getting late, the level numbers changed into funny shapes and everything went really fast. The levels which generally hard were level 7 and level 8.

Lee Patten  
60 Ayrfield Road  
Bedford  
MK43 5UP

DOES this mean there's even less to do in Bedford of an evening than in the Isle of Tint? Perhaps you need a foreign break. But...

TD and all speculations about the highest score on Chuckie Egg: I do have it! It's 1,520,420!! This seems unbelievable, but is easy to explain: from about 450,000 the speed of the ducks stays constant, so you only have to aim to get more bonus-runs than you lose. I had enough after 32 hours, and interrupted the game in level 33.

With best wishes to all British Dragon users.  
Andreas Meyerow  
Rathenaustr. 2  
D-8530 Otzenhausen  
West Germany

WHAT we need is a totally new approach to this game...

REFERENCE: In score corner, you let make me so anxious with your multi-800s scores.

I have never got past the level which has three ladders at the top of the screen, each with an egg at the top.

How do you get the two eggs at the left hand ladders?

Anybody help me to get on and beat those massive scores!

H. Jones  
84 Alden Street  
Gardiner  
Rochdale  
Lancs  
OL9 7UL

No, No, No, I think you have the game of a new concept here! All it needs now is somebody to work out a way of playing Chuckie Egg for 48 hours at a stretch without getting beyond level one.

We haven't printed the solutions to the Dragon crosswords yet, so here...

1	PITFIEND
2	OTHELLO
3	ELDIABLERO
4	SKRAMBLE
5	LASERZONE
6	MUTANTWAR
7	RAINBOWWRITER
8	DOWNLAND
9	COMPOSER
10	SHAOLINMASTER
11	DONKEYKING
12	JETSETWILLY
13	GHOSTATTACK

The December 1987 crossword solution.

1	ICECASTLES
2	ROBINHOOD
3	MUDPIES
4	SPACE SHUTTLE
5	HUNGRY HORROR
6	TUBEMAYARMY
7	EIGHTBALL
8	CRAZY PAINTER
9	GRAND PRIX
10	DANGER RANGER
11	MOONCRESTA
12	DEVIL ASSAULT
13	SHOCKTROOPER

The January 1988 crossword solution.

NEW HIGH-SCORE ON CHUCKIE EGG: 2,216,000 LEVEL TWENTY AUGUST 1987 BY MARK AND JACOB HENSON'S GAME LASTING ABOUT 2.48 HOURS.

THIS has been a public service announcement...

FOR fear of strangulation from Mr. McCullough (September letter) I put forward my claim for the highest score ever on Chuckie Egg. I scored 4,081,700 on 24.10.84 and have rarely played it since (no wonder). After level 36, the numbers change to eggs and various other parts of the graphics of the game. I reckon I reached around level 33.

Even though this may not believe me, I'm was definitely not pale aided and was in my truly old Dragon 32. The game stops getting harder after about level 32 and stays at the same speed for infinity, so I could have scored an awful lot more, but after 8 hours almost continuous play I simply got fed up and went to bed! If anyone has beaten this score I'd very much like to see it.

N.J. MacArthur  
Middleton PO  
Isle of Tint  
Argyll  
Scotland  
PA77 501

## New adventure from Dragonfire

DRAGONFIRE Services have announced their first adventure for the Dragon, *Pyreventure*. *Pyreventure* you seek to enter the lost lands of King Tutankhamun's father, you might find the ancient Amorphia. It's gold, death mask and his fabulous treasures. But will you come forth alive?

*Pyreventure* features real speech, freeze and save game facilities. "A real humdinger!" say Dragonfire. The price is £3.

plus 50p post and packing in the UK, £1.50 post and packing overseas. Overseas payment in pounds sterling by international money order, please.

Dragonfire have several other titles in the pipeline, including *Decathlon*, *Marathon* and *Spoolbox*, *Dragon Music* (series) and *Underlings of Croth*. Send an SAE for a full price list. Dragonfire are also interested in looking at software for prospective publication.

## 6809 show — Dates mixed up

**IMPORTANT UPDATE:** John and Helen Parris apologise for getting the dates mixed up on their Show ad, in last month's issue, and place a local 16 epidemic and Demin extract in mitigation.

The REAL dates of the ap-

coming shows are: Saturday 30th April at Ouseley Town Hall, one of the Dragon world's favourite venues, and Saturday 29th FEBRUARY at Cardiff Wales Airport. For further information, contact John Parris Software on 04-603 5976.

## WP waits for words

RIP Software of Surrey has produced a new word processor to meet his requirements, and would like to know if other readers are interested in his program.

The vital criteria are a 64-character WYSIWYG (what you see is what you get) in on screen display, all necessary instructions for use displayed on the screen during runtime, easy to use facilities for redefining printer codes for any connected printer and amend the display of printer codes for easy comprehension, as well as user definable auto-repeat keys, user definable line and ball, auto word wrap, alternate line feed print, boldface facilities, on screen repositioning of titles or windows, display with or without headings or screens, and, with the Epson FX80 printer, 32 fontstyles and sizes, fully mixable.

Anybody wanting further details can contact Mr. Sibtorsport High Green, The Drive, Bainton, Surrey GU2 7DH. It is not clear whether an offer is offering the package for sale — we got the impression that he is waiting to see if there is any interest.

## North East User's club

THE North East Dragon Users Club has 14 members and meets every Wednesday evening in the Elmslie lounge of the Grindon Mill, Chester Road, Sandeford. Anyone who is interested in contacts along, or contact the organiser, Chris Johnson, 22, Washington, Biddock Village, Washington, Tyne and Wear NE28 7H.



## Club in Norway

The Dragon Computerklub of Norway has written to say that they will send a copy of their 24 page monthly magazine (A4, duplicated both sides, in Norwegian) DCK-Mens to anybody who enquires.

Dragon Computerklub has been running for three years, and can organise orders of software from England for Scandinavian members. Enquiries to Ole Eddy, Stokken, N-5410 Supvag, Norway.

## 68 Microcosm this month

THE December 1989 issue of the 68 Microcosm, the journal of the most micro group includes *COMET* on the Macintosh, the *Transputer*, a file size formatter program, an introduction to the Data Protection Act, pick of topics from *Low Goodwill's* Micro Bulletin board, small ads, lots of letters and the offer of a Cardfile program. Also a review of the 6809 Colour Show. According to the membership etc., the last

address of the interested microcosm. What to mean is that there was a typesetting mistake in the title word in the middle. As this is no more ambiguous than the average person's handwriting, image-conscious will still reach their destination. The very right address is Mr. K. Barnes, 19 Glen-Alys Road, Wimbledon, London SW20 6ED.

## Computa — Text call

WOULD anyone who purchased a copy of *Computa* — Text from Dragonfire Services at the 6809 Colour Show in December please contact Dragonfire at the address

below, sending their names and addresses, so the instructions are now ready.

Dragonfire Services, 13 Parry Jones Close, Watna, Gwent NP23 5PH.



# In the land of the crystal chandaliers

Ken G. Smith returns from the 8th 6800 Show with his impressions

WHEN I saw there was going to be another 6800 Show in London, I didn't believe it. When I got to the Connaught Rooms, I believed it even less. Crystal chandaliers? GAKKETT? And casual seating — this was some venue for a Dragon Show. The Grand Hall seemed much larger than the Old Horticultural Hall. The dealers, who obviously felt safer with their backs to the wall, were spread around the perimeter. The new venue made this a very comfortable place to attend. The attendance figures seemed to me to be more in the hundreds than thousands and the size of the hall seemed to emphasize this.

The Dragon market is now so small that it is a pleasant surprise when new software is released. Well, just to prove that they are still surprise us, two suppliers chose to unveil new games at the show. The first of these, Quickdraw, pulled their stall show with all their current large on sale play the new one, indoor Football. Truly a fascinating program with crowd noise and action replays, it is almost as much fun to watch someone play and to keep the younger showgoers amused for hours. The second came from Permonics, had previously noted for bargains. Pam Drake's new game up with a great winner for her first try. Called 'Golem' this, it is a light screen master game featuring several different tracks and the software designed against the computer in another player. Available on disc or cassette, it provides real competition for Speed Racer. Well done, Pam! In all I can say:

## Bus Extension

Harry Whitehouse, who you will remember used to trade as Peabody, was there with his usual supply of pyrotechnics, these wonderful power supplies and some new keyboards. This time Harry, who jointly promoted the show with John Perry, was also offering his new Pro 68000 interface which seems to be bringing a lot of Dragon 02 users on line. Offering an extra socket and about extension, it can be used in conjunction with a disc drive. However, it must be said, you will end up with a rather long cable bridge. Although he is one of the few that will have to be told when it stops producing goodies for us, Harry is getting involved with other machines and now, in fact, keeping out Spectra's all fully five pounds each.

Another corner show, Bill McGowan demonstrated how to use his Printer Control as a disk top publishing system. Also

*it is well worth  
to meet old  
friends, make new  
ones, and talk about  
the machine to  
which we are all  
committed.*

on show were the results of Bill's Colour-print program which converts the four colours of Proton 3 into different densities of print. The end result is a black and white picture of amazing quality. McGowan's software has reached the stage where it outstrips anything of a similar nature and should advise you carefully anyone who has just bought a printer is 'That's All McGowan'. Bob Harris, who also markets McGowan software, was demonstrating his own PSLN story. This gives the humble Dragon 04 something of the environment of the Apple Macintosh and runs under the BASIC47 operating system. Bob's is one of the few software houses that is actually increasing their range of Dragon products. They even offer an upgrade service where for thirty five pounds they will board your old 68 to a full 68K, making it capable of running BASIC42, FLEX and GEM.

H C Andersen's arrival proved that stories of his fairly tale existence were nothing more than a Grimm version. The big blunder Datto was cooking up games at a pound each and 68000 at under eighty pounds, complete with both manuals. He certainly seemed to be enjoying himself, I only hope he found it a rewarding experience.

With mountains of supply software slowly arriving away John Perry has shifted his emphasis away from selling off surplus stock at discount prices and is now distributing more current software. For those of you who like the real wonder what has happened to the final bug free version of Total Eclipse I can tell you that John

has it. He is also distributing David Mather's excellent Action Maker. David was at the show demonstrating his wares and I must say the results were remarkable.

All the usual user groups attended plus one new one dedicated to Delta Dos users. (DUBs). They had one of the new Tandy 100K CoCos with enhanced graphics on show. Rumours were rife about this machine, mainly as to whether production was on or off. The performance looked quite good but whether it could stand against competition from the likes of Alan is another matter. (DUB) were up on the balcony along with the boys from 'Dragon's Door' magazine. Their supply of free copies soon ran out and Simon Jones was taking orders. I have now received my copy and have to say that it is very professionally presented and comes for a wide variety of readers. Also up on the balcony, I had a very interesting chat to Ted Baccarelli of 88 Microvision. If any of you wants to run hard discs on a Dragon then feel in your man. He can probably even supply the parts.

Well, as usual, I enjoyed my time at this year's London show. However, the falling attendance makes me wonder how much longer such an event can continue in its present form. As long as it does, I, for one, will gladly play for my ticket. It is worth it to meet old friends, make new ones, and talk about the machine to which we are all committed (or for which we should all be committed.)

## "Stirring" Smith

Now, to air things up a bit, I have decided to make the following recommendations for an imaginary show event called the Golden Dags. 1. Best new hardware, Harry Whitehouse for his 'New Pro' 68000/Modem driver.

2. Best new software, I have to judge this one between Permonics for 'Golem' this and Quickdraw for indoor Football.
3. Best show idea, Dragon's Door for their two Microcal disk up.
4. Best bargain, National Dragon User Group for their thirty five pound Modem package.
5. Man/Woman of the show, Hank Andersen for his only users and the effort he put in just to get there.
6. Modest Raspberry, Congratulations for being the only people offering less than ever. Wish they were turn up when they have sold all their 'Plus' boards!

# Dragonsoft

## Getting into this game is just for kicks

**Title:** Indoor Football  
**Supplier:** Quickbeam Software, 20 Salisbury Road, Hordesdon, Herts EN7 1JH  
**Price:** £9.95

I seem to have become Dragonsoft's football correspondent as our dear Editor has given me the task of reviewing Quickbeam's latest offering...Indoor Football.

There seems to be no shortage of quality Dragon football games around, what with *Champions* (and the new *Champions*), *Football Manager* and *Gravy Fists*. But now Quickbeam have come up with what is quite simply the best 'full perspective' arcade style football game on the Dragon! These words come from Quickbeam's advert for the game, but when I've played it, I'm sure the ad is good, but *Indoor Football* is better.



*Indoor Football* follows the same method of play as *Gravy Fists* (where the player controls his/her team and battles it out with an opponent). I prefer this type of football game to the likes of *Football Manager* where there is absolutely no skill involved, and the result of each game depends really on luck. However, I don't think it's quite right to drop all the features of that type of game, one of the better features of *Football Manager* and *Champions* was that each team played in a league and throughout the season battled for a place in the Cup and Europe. In *Indoor Football*, are simply plays either the computer or an opponent for a certain time and once the time is up, that's it.

In the game you control the leading character (you'll notice there are two, you control the one in your colours). You have direct control over this player, and with him it is possible to tackle another player, simply run up the field



with the ball, pass the ball to another player, or take a shot at goal.

There are other players on the field which move independently, and they are capable of running towards a loose ball. Once you've got the ball it's a hard slog to get to the other side because there is always an opponent hot on your heels and you've got the ball, you're slower than the other player. What it does mean is that you frequently have to run round in circles trying to dodge your opponents' moves. However if you manage to beat this player and the rest of his team you'll just have goalkeeper to contend with, and assuming you score you will be awarded with a loud cheer and/or motion action replay.

The game is split into two halves, the ball being replaced in the centre spot at the beginning of each half.

Before the game begins you are given a number of choices. You can choose the number of players in each team, you can choose whether to play a friend or the computer and you can select the length of each game.

One thing which struck me after playing was the lack of realism. As most of you will be aware, Quickbeam have produced some great sounds on their games with their DAMS program (must get it some day). However there's no music on this game and indeed there is very little sound on the game, the noise of the ball bouncing and the cheers



from the invisible crowd being the only sound.

The graphics are in 3D and are good (a little simple). The

players seem very familiar to me — they're very much like the soldiers on *Pin Force* and they too are drawn well. As usual Quickbeam have used larger than normal sprites to ease the eyes.

There seems to me to be a slight fault in the direction, as all too often I've had goals scored against me that are quite obviously not valid. Even in slow motion it's obvious that a goal should not have given. The design of the goalposts don't help the matter very much either as they're in 3D, making it even more difficult to distinguish just what is a goal.

Another problem which happened quite often was that although I had kicked 'T' or a player, after a while most of them disappear — in fact I've seen many disappear before my very eyes (transferred to a large box, very likely — Ed). Quickbeam have come up with some great cassette inlays but this time their presentation is somewhat to say the least. Even *Gravy Fists* seems to be more professional.

Now I know many of you will say it's the game that counts, not the cassette inlays, but if computer enthusiasts who sell their games go to the bother of making their product look decent enough then I'm sure Quickbeam could do the same.

If these few comments lead you to the impression that I loathe this game, you've been fooled! I absolutely love this game, the good graphics coupled with the extreme realism of this game combine to give possibly one of the games of 1987. OK, it may not be graphically stunning, it may not have hot sound, but after a playing *Indoor Football* you'll agree that to one side, and get on with playing what is a great game.

For me it was a joy to play *Indoor Football*, it was certainly addictive and very competitive. I'll give it five Dragons, but if you don't agree you know where to find us.

Donald Morrison



## Living on

**Title:** Zork  
**Price:** £2.95  
**Supplier:** Pessan

*ZORK* was, hurricane and invading armies, all part of daily life and ferocious giant slanders *Zork*. Having accidentally discovered the hole you get the job of running it, and you might guess that it's not one of the most secure jobs in the world.

*Zork* is almost two programs: on side A of the cassette are instructions with what seems like several dozen pages of text. These instructions delve to great depths to help you understand just what is going to happen — but after so many games where instructions have consisted of something like 'Type Q' and the game will start automatically. Use right joystick, these attempts have to be welcomed.

The instructions even go to the extent of giving you a little test to see how much you've

understood. If you answer correctly you move to further instructions. If you are nearly right you are told of the error of your ways and then move on. However, if you type 'Z' when the answer is '3' you are told not to be silly and answer again.

The length of time I spent describing the instructions shows their size but the game is not as complicated as it may momentarily seem. You are given a store of office ranging from 1 to 20 years starting in 1987. The initial level 1 is easy. Discovered it, well it isn't a little, the middle I suppose. You're also asked if your lovely Dragon will permit the £24.95, 0 price is help speed up things slightly.

The little Southern paradise consists of 16 blocks of sea and 38 of land making up a 9 by 6 grid. Given a starting population of 500 and food for that number, the task with a limited supply of money is to meet the growing population.

## Heir raising tasks

**Title:** *The heir of Igo*  
**Supplier:** Simon Mangrove  
**Price:** £5.00

SIMON Mangrove's adventures, starting with *Demons*, is a game with a good plot, which is rated at four Dragons in the Dec '87 issue. Have by the time in the series been enhanced tremendously so that the second product is even more of a professional all-round package.

In *The Heir of Igo* is the tradition of the hero having an old name, you are called as Khraty Mamodu and live on planet Iyes in the Ikonopt system. The task is to find the smelter of Igo to stop a neighbouring King's siege.

You start when you awake at the top of a pyramid shape class by a teleporter and the number of locations increase as you progress down the four levels of the pyramid. In total there are over 200 locations, although despite my best and drastic attempts I have absolutely no idea how many.

Other locations include medical laboratories, where a nurse obviously lures with a syringe, an apartment, covered balconies and a canteen. Plus there's a shattered tube where vacuum no longer exists and you are promptly sucked to your death.

The reason for my scepticism over daily task being simple in this adventure is that instead of merely finding an object and next game going back there you have to search other areas for the item. Not being able to bypass previously unvisited locations is due to the items are randomly placed.

Complex could be used to describe the commands. Give the syllable to the nurse after removing the needle being reminiscent of *Deadspace*.

This is easily the hardest of the series, so give it a try.

Philip Scott



## an island

Each year you can buy items, like ships or housing, one unit of each being sufficient for 500; don't buy enough and the natives will get restless. Also on the shopping list are various priced items like factories which provide work and earn extra money (each unit for 1000), schools, hospitals and others also help keep the masses quiet for a while.

A small island is easily attacked. Though and to a defence is needed. For 75 units of money 50 soldiers are added to the starting number of 150. These men are certainly needed when foreign armies start attacking because if you allow 3 of their bases to be set up permission reluctantly comes and the gullies will be wheeled out for you.

Civil wars are perhaps even worse because due to the sword, the masses rampage through the streets and fields destroying most of the hard work and effort.

Humans have a similar effect, there's one at least every seven years (counts like the bus service) which starts and travels randomly destroying all in its path (perhaps it is the bus service).

And that's about it. The games displayed on what has become almost the norm — that is the black/white screen, the island displayed graphically with red/white text messages underneath. If you survive your term you win if you don't you lose. There is a score feature but this is almost irrelevant in a live or die game.

Not a brilliant game, or far that matter original but it is excellent value and is well programmed and displayed. Definitely one for the trainee managers.

Philip Scott



## Put another disc on the juke box, baby

**Title:** various  
**Supplier:** Preston  
**Price:** £4.99 each (Dragondisc disc)

A new range of budget priced disc games has been launched by R. & A.J. Preston. The games are not new ones but this is the first time they have been available on disc at the low price of £4.99. Two game discs are reviewed here; the first is a compilation of three games, *Ruby Robbe*, *Revenge* and *Deadspace* Disc.

An initial menu is displayed after BOOTING the *Dragondisc* disc. From this you can choose to play any one of the three games. It's not possible to go back to this menu; to change games requires powering off.

*Ruby Robbe* is a curious mixture of the Connect 3 and Sliding Square puzzles. Using either keyboard or joystick you control a pointer which moves around the edge of a 10 by 10 grid of blue blocks. These blocks are either solid, or contain snakes or guards or a mystery bonus of between 100 and 300 points. The ruby is shown as a red block. Within the blank squares are mines which can kill the snakes and guards for extra points.

The blocks can be moved directionally using the fire button or space bar. The object of the game is to push the square containing the ruby into a 'trap' at the top left of the screen. This is made more difficult than it sounds by the snakes and guards, which will return the ruby to the bottom right of the screen if they get near it.

Although this initially seems quite an original game, the challenge isn't high — there isn't really enough variety in the total of 18 difficulty levels.

The object of the game is simple to grasp, but to capture the ruby requires some logical thinking — hence this game is ideal for the younger player.

*Deadspace* Disc is a familiar platform and ladder type game — guide the little figure down the screen avoiding the flying bits, ducking the falling bits and jumping the stationary bits. *Deadspace* Disc is not one

of the classics of its genre.

*Revenge* Disc is a simplified version of *Demons* Ring. The slight difference is that diamonds must be collected one at a time and taken to the track at the top of the screen. Three diamonds are needed to move onto the next screen and there are four screens in all. An 'Orbit' appears on each screen (it looks like an old-style radio to me) which slowly turns on as you once you start jumping. Moving platforms and other enemies must be negotiated.

The mode 3 graphics are fairly well defined, but do tend to get rather flickery at times (is this game machine code or just compiled Basic I wonder?). If you specifically want a version of *Demons* Ring then visit at Microdeal's offering. As a third on this budget disc *Revenge* Disc is a nice treat.

None of the games on this disc are extraordinary in the world of the 80s. However, at a price of £4.99 they can be recommended to the gamemaster who can't wait for tapes to load.

The second disc I looked at contains just one game, *Kung Fu* — The Master. Again this is loaded by BOOTING the *Dragondisc* disc. The object of the game is to rescue your girlfriend (don't I always?) who is, for some unexplained reason, being held captive. To do this you must get past screen after screen of 'trainers' (who look just like you), knives, snakes, bombs and fire-breathing dragons. The joystick is used to do all the usual kung fu stuff like run, jump, duck, kick, sweep and various types of kick — all nice and violent. Points seem to be scored for hitting just about anything in sight.

The mode 3 graphics are quite well animated and flicker free with some nice horizontal scrolling included. The sound effects are also nicely defined.

This is probably one of the better kung fu games around for the Dragon at the moment.

Brian Gedge





number of different ways — see if you can understand at least one of them!

Associations#002-to-020 are used directly in general and the value #004 appears in the label returned the first instruction, one can assume that the code is intended to reside from #000 to #004 in memory, with #004 being the address of the first program instruction. Using Dream and assembler with similar 'redirection' facilities, listing 8 can be instantly adapted to match the original generated code by including the lines

```
ORG #0004
PUT #0001
```

before the first program line. The listing of this is not included as I am continually expanding my memory space allowance! The generated code is then identical to the book and occupies #0004-#00458 inclusive. This can be saved using

```
CSAVEFM#BL000007.&#0001.&#0053.
&#0001
```

and relocated for use with

```
CLCALDM#BL000007.&#0003
```

(Reserved from here with

```
CSAVEFM#BL000404.&#0004.&#00458.
&#00404
```

if wished). Remember that the program also uses locations #0000-#0003 as variable space, so a clear of at least CLCALM#000.&#000000 is required before running the code.

A second option with the code should you not be able to generate it to execute it from #00404 would be to leave it position dependent but to change the addresses of the variables space from #0000-#0003 to be within our chunk of code. This involves creating variables space using label names, and an assembler directive that may be slightly different to your assembler but is P000 (Reserve Memory Bytes) in Dream. One can usually reserve any number of bytes using an RMB directive. To avoid having to totally understand the program logic when trying to adapt similar published listings to run on your systems, I suggest that you adopt the method of allocating a label name per possible variable address and substituting actual addresses in source code operands with its respective label name. That is, in the double byte units, sometimes as double byte units. Rather than have to sort out each case individually, give each byte a label then substitute each address with its label, which should result in a position dependent but working program as in listing 10. The code is saved using

```
CSAVEFM#BL000670.&#0001.&#00533.
H0003
```

and is loaded/relocatable from that address only. P 0 is the use of the third parameter in the CSAVEFM — the default EXEC address which is not the first byte saved if including the variables data area #0001-#0004 in the saved chunk of code (my preference is that you don't forget about such areas when fitting several chunks of machine code close together in memory).

Another option is to make the entire chunk of code relocatable without it without then whenever we wish to load it at any one time. To achieve this is a relatively simple task if any actual memory addresses have been substituted with label names as in listing 10.

Extended address instructions need to be amended to relocatable types. JGRTs, as we have met previously, should be replaced with JGRTs (Branch to Subroutine). To make references to variables relocatable, if they have been given label names as in listing 10, simply append, PCR (Program Counter Relative) to the operand — or your assembler's equivalent as this, again, may be an area that differs slightly and perhaps, PC rather than, PCR is needed (Dream actually works with either). As with branch instructions that generate code to branch "Relative to the end of the current program instruction". Program counter relative access of variables causes code to be generated that refers to

#### Listing 10

```

0000  MOVW2 0000 0 1 PCR &#0000
0001  MOVW2 0001 0 1 &#0001
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0363  MOVW2 0363 0 1 &#0363
0364  MOVW2 0364 0 1 &#0364
0365  MOVW2 0365 0 1 &#0365
0366  MOVW2 0366 0 1 &#0366
0367  MOVW2 0367 0 1 &#0367
0368  MOVW2 0368 0 1 &#0368
0369  MOVW2 0369 0 1 &#0369
0370  MOVW2 0370 0 1 &#0370
0371  MOVW2 0371 0 1 &#0371
0372  MOVW2 0372 0 1 &#0372
0373  MOVW2 0373 0 1 &#0373
0374  MOVW2 0374 0 1 &#0374
0375  MOVW2 0375 0 1 &#0375
0376  MOVW2 0376 0 1 &#0376
0377  MOVW2 0377 0 1 &#0377
0378  MOVW2 0378 0 1 &#0378
0379  MOVW2 0379 0 1 &#0379
0380  MOVW2 0380 0 1 &#0380
0381  MOVW2 0381 0 1 &#0381
0382  MOVW2 0382 0 1 &#0382
0383  MOVW2 0383 0 1 &#0383
0384  MOVW2 0384 0 1 &#0384
0385  MOVW2 0385 0 1 &#0385
0386  MOVW2 0386 0 1 &#0386
0387  MOVW2 0387 0 1 &#0387
0388  MOVW2 0388 0 1 &#0388
0389  MOVW2 0389 0 1 &#0389
0390  MOVW2 0390 0 1 &#0390
0391  MOVW2 0391 0 1 &#0391
0392  MOVW2 0392 0 1 &#0392
0393  MOVW2 0393 0 1 &#0393
0394  MOVW2 0394 0 1 &#0394
0395  MOVW2 0395 0 1 &#0395
0396  MOVW2 0396 0 1 &#0396
0397  MOVW2 0397 0 1 &#0397
0398  MOVW2 0398 0 1 &#0398
0399  MOVW2 0399 0 1 &#0399
0400  MOVW2 0400 0 1 &#0400
0401  MOVW2 0401 0 1 &#0401
0402  MOVW2 0402 0 1 &#0402
0403  MOVW2 0403 0 1 &#0403
0404  MOVW2 0404 0 1 &#0404
0405  MOVW2 0405 0 1 &#0405
0406  MOVW2 0406 0 1 &#0406
0407  MOVW2 0407 0 1 &#0407
0408  MOVW2 0408 0 1 &#0408
0409  MOVW2 0409 0 1 &#0409
0410  MOVW2 0410 0 1 &#0410
0411  MOVW2 0411 0 1 &#0411
0412  MOVW2 0412 0 1 &#0412
0413  MOVW2 0413 0 1 &#0413
0414  MOVW2 0414 0 1 &#0414
0415  MOVW2 0415 0 1 &#0415
0416  MOVW2 0416 0 1 &#0416
0417  MOVW2 0417 0 1 &#0417
0418  MOVW2 0418 0 1 &#0418
0419 
```



# Total Profits

*Alpha Centauri School of Cost Effective Plundering graduate Julian Brown has some tips for traders.*

**EVEN** after all this time many of you out there are still struggling, trying to make a living out of the much simplified trading, while people like me have made multiple visits to the second universe. So out of the kindness of my empty bank account I have decided that all you sufferers out there need my help badly. (Anyone who needs a living writing for *Dragon* User needs help, mate. — Ed.)

I have been limited on space, so this will have to be brief, so listen good!

Here are the basic tips:

1. Avoid security worlds, unless you want to be used for target practice.
2. Keep your ship in a good state of repair at all times.
3. Never pay the pirates.
4. Know where the repair centres are (see table one).
5. Make sure you have a good trading route.

you wished economics ethics aside, this is more characters than it sounds. Trying to get narcotics is nearly impossible. Tailoring the amount you collect is easy and best illustrated with by table two.

Table two

Number of holds	Maximum no. of cargo units
1	2
2	4
3	6
4	8
5	9

When you have the maximum number for your hold, regardless of whether it is food, textiles, etc., you can't collect any more. But by adding other cargoes the total value rises.

which increases the cash you gain per trip if you use a full cargo hold. Follow this up with fuel tanks, three lasers, three computer expansions.

Once you have all of these buy the drilling bit, eight wellpups and a hyperspace. With all this done, you are on your way.

## Drilling

Find an asteroid with a reserve of at least 10 and fire its weakest point in the crust. Using a **HEAT** drill, start drilling, stopping every time the drill bit reaches about 40 degrees, and allow it to coast. Once the asteroid is full then cap the well.

Go to a space station (you won't find one in the same galaxy) and sell your load. Once this is done, it's worth waiting a few lifetimes while the value of asteroid goes back up again. And get yourself another drill.

## The Prophet

Once you have collected cash in the region of a few billion credits you should start to receive telegrams from the prophet, i.e. to Phoenix and you will receive a shard. All that remains is to fly down the nearest black hole.

Universe two is a nasty place. Everything costs ten times as much, there are dead ships to be salvaged, and most of all the megagames don't work because of a bug in the program. Last but not least, even though the names of the cargo items don't change, you'll have to find new initials for them, except the luxuries. The names are supposed to change, but another bug in the program prevents it.

Finally if you'd get black and need consolation I can supply a completed version of my editor program that runs on ALL *Dragon* for 25 plus 75p for postage and packing. Just send your request to: Julian Brown, 2 Lavender Cottage, Saltern's Lane, Freshwood, Bucks HP16 0PT. Don't forget to include your own address, and don't forget the money, or you may not receive anything!

Table one

PLANET	COORDINATES	PLANET	COORDINATES
JUPITER	1:1:1	ZEUS	1:1:1
ISPELA	3:4:2	DIOS	2:3:3
BAUTLA	2:6:4	ELIOT	2:3:6
MOORE	4:3:1	KEENE	4:3:3
WONKA	4:1:5	FLORA	5:3:2
SKAFIA (spaceport)	5:5:2	WICKES	5:1:4
SMITH	5:2:5	LARSEN	5:5:5
POWERS	6:1:3	JOVICH	6:3:6
JOVIAL	7:4:3	LIARSA	8:4:1
WHICH	8:3:4	ATUCHI	8:3:6
TUMPO	8:6:6	TTAMPI	10:1:2
TYARD	10:3:5		

The format for the co-ordinates is sector by All of the above have repair facilities but some are cheaper than others. Skafia is the most expensive planet and is best avoided at all times.

The recommended trade route is between Tareve (7:1:3) and Skual (2:3:5). Buy uranium at Tareve and sell it at Skual (but don't buy anything for this return journey).

## Technicalities

Space planets that have landing taxes are best avoided unless you know what you are doing. If you do visit them make sure it's last visit.

At the end of each combat you automatically collect cargo left by the pirates. This cargo is always a collection of three items: gems, narcotics and narcotics. With no load and one cargo hold you collect two items; empty hold you buy increases this number to a maximum of six; after this the number reverts to zero and then two again.

Until you start to collect six or more items

hold is more than the maximum listed above, you will receive extra.

For example, if you had one hold with a single unit of food, you would collect 1 unit of booty, but if you had instead 3 units of food you would collect 7 units of booty.

It is best to tailor the results so that you receive 8 units of booty, which is the maximum safe number.

For example, if you have 1 hold, carry 5 units of cargo. If you have two holds carry either 10, or 9 units of cargo, with three holds carry 5, 11, 10 or 25 units of cargo.

Don't forget, always pay import taxes and avoid narcotics.

## Upgrades

If you take my advice and start trading between Tareve and Skual then upgrades will be readily available to you. Don't be tempted to buy extras for your ship as soon as you have enough money; wait till you have about twice the amount of money you need, in case of disaster.

Always expand your cargo hold first,



# READPC

*Martin Warmear devises a program to read PC discs on a Dragon*

A program to read DragonDOS diskettes on a PC has been available from CompuServe for some time now. One of my friends who owns both a Dragon and PC is very happy with it: it is well made and easy to use. Personally however I have been much more interested in software to do the reverse: transfer PC software in Basic, Pascal and C to run on my little Dragon.

## The problem

More than a year ago I was faced with a professional need to get a number of large files from a PC diskette into my Dragon. The solution I chose was to purchase the PC-READ software from D.P. Johnson — an American professional OS-9 programmer — which is made for the Color Computer and also runs on the Canadian-made Sordis OS-9000. The latter machine is the one used by a friend of mine — he built it himself from the circuit boards — and I asked him to transfer my files to Color Computer OS-9 format diskettes, which the Dragon can read.

A little complicated, though, I suppose there must be many Dragonists who would like to use some of the supposedly abundant PC software on their home machines, or who use a PC at work and have made programs and files for it which they would like to use at home also. There might be even frustrated PC owners fascinated by the idea of upgrading to the Dragon's superior operating system, but held back by the difficulty of transferring their materials. Anyway, those days are over now, as the following programs allow for the easy and quick transfer of even large ASCII files — texts, software source codes, whatever — from MS-DOS diskettes to either DragonDOS or OS-9.

## Using READPC

Accompanying this text is a Dragon Basic listing of a program which will read an MS-DOS diskette, present you with a directory and transfer the file chosen by you (by number 1...), a cassette tape, as a Dragon Basic ASCII file. This unconventional solution was chosen (i) to allow single-diskette users to use it and (2) not to place a very limit on transferable file size.

LOAD the program and RUN it; wait until the MS-DOS directory appears on the screen. Choose the file to transfer (by number) and press ENTER. Make sure the tape recorder is connected and ready and an empty cassette lined up and ready to record, and both Play and Record buttons down. Especially with large files, the transfer may take some time, so be patient.

In case the directory is larger than the screen, you can stop the listing by pressing the **STOP** key. You can repeat the directory listing by just pressing **ENTER**, in (by specifying Menu item 8). A limitation of this program is that only "base" files in the MS-DOS root directory.

Obviously you cannot transfer listed files in a non-British European language: the "extra" characters which occur in Spanish, German and Swedish/Finnish are treated by MS-DOS in a way which violates the ASCII standard. Where ASCII has those characters in the same places as the British or US ASCII set has square brackets, braces and/or like like, IBM has been creative in using 8-bit codes instead. All 8-bit codes are replaced by READPC with question marks. So are braces and other characters that the Dragon's cassette I/O system does not recognise. In case you want those transferred — important in for example C source code — you should either replace them on your PC, or be prepared to correct them afterwards on your Dragon.

The above program puts your file to cassette as an ASCII file, which can be read by word processors like Microsoft, Alkermis, or a Basic program can access the file as a data file by using the well known **LINE INPUT #1** statement, which reads exactly one line (direct from cassette return to carriage return) from the file into a single text string.

If your text happens to be a Microsoft Basic program, you can try to load it straightaway into the memory and edit it by the Dragon's own line editor. It is likely however that it needs some cleaning up before this works.

## Getting to OS-9

To transfer the files on tape further to OS-9 requires additional software written to transfer Ascii-type files in general to OS-9. Here the building block approach the OS-9 philosophy is advisable. What I did was simply write an OS-9 device driver for the Dragon's cassette recorder; it treats the device as a sequential character file which is only capable of input. With the driver goes a descriptor, a little table of values defining the settings of the peripheral device. I obtained both by disassembling and suitably patching the ACORN serial port driver and its T1 descriptor.

Perhaps these programs could be streamlined a little more, but they have been tested and work as they are, in order to use them, assemble these source codes and let them reside in your expansion memory. Ready your cassette, BOOT OS-9 (always before every transfer) and load the

modules **CASS**, **CR**, and **COPY** or **LIST**. To get your file on the screen, you would write:

**OS9>cat /cr/ENTER.**

but presumably you are more interested in file transfer, this works with **COPY** as follows:

**OS9>copy /cr/pathname/ENTER.**

## Cleaning up

When listing the file received, you will generally notice that it contains besides carriage returns (ASCII 10) also line feeds (ASCII 13). This is typical for MS-DOS ASCII files, but the Dragon wants only carriage returns. A second problem is that the cassette I/O system has generated spurious carriage returns in the file.

Both problems are corrected by the following little program T, which is written in BasicOS. While I in **SAVE L.PACK** used use it together with **PureB**, as follows:

**OS9> /codefile /newfile/ENTER.**

which will produce a new file with the proper amount of carriage returns. At the end of the file there will still be some junk however, but that is easily edited out. READPC does not check for the precise file length of an MS-DOS file.

## Nonstandard formats

I have succeeded in reading at least the 720K 35in MS-DOS diskettes used in many portable machines by the following modifications: 1) change the parameter **DISKPART** in **codefile** to **720** (change line 130 to

**DISK PART LON=720 TO 720**)

For other formats, other parameters should be changed (number of sides, number of sectors per track), but I have no experience with this. There are plenty of good books on MS-DOS disk structure in public libraries, for example to help you, as well as the excellent (and extensively stolen) Norton's Utilities.

You could also cannibalise a general-purpose disk browsing utility from the READPC sector read routine. When doing so, be aware that this routine is (nearly) general-purpose, and not limited to sector sizes of 256 bytes, but reads any sector size. Furthermore, the sector read is double density only, but even this limitation can be removed: the Dragon hardware supports single density disk I/O and only waits for the programmer to use it.









# How green is my black

Paul Reid gets bored with black on green, and invents an inversion.

This video display generator (vdg) chip in the Dragon, the one that dictates that we are stuck with a really rather bland black-on-green text display and black screen border, is the Motorola MC68471, located on the main board near (on the Dragon) the cassette and joystick sockets.

Consulting the specification sheet for this particular chip, I discovered that pin 32 can be used to invert the screen colours in Alpha (text) mode. This is done by ground- ing pin 32. As with most video chips, the normal inverse video characters, the lower case set, are not generated in this way and are unaffected by the mod. This has both advantages and disadvantages. On the plus side, a basic program listing on the screen which includes lower case text intended for output to a printer, will appear as 'normal' text - but inverted along with everything else, rather than as blocks of inverted characters which if they have upper case characters mixed in with them, makes the whole thing very difficult to read. On the minus side, it is difficult at times when inputting lower case text in the inverted state, to know whether you are in upper or lower case mode!

the switch and the switch itself, a single pole double throw (spdt) type, along with three lengths of insulated wire each about 40cm long. Switch off and disconnected the power supply.

*I discovered that pin 32 can be used to invert the screen colours in Alpha (text) mode*

(see Figure 1). On some boards, the vdg is fixed in a socket, if this is so with yours, remove the chip taking care not to bend the legs. An IC fitting/removing tool should be

After separating the two halves of the Dragon's case by removing the four screws located one in each corner of the base (well, there may be some Dragon owners who haven't been inside theirs yet!), drill a suitable slot-hole in the most convenient, accessible place for the switch, remembering that you will want to be able to operate it while using the computer. Identify pin number 32 of the vdg chip and also pin 30 used if possible. Bend pin 32 outwards so that it is at 90 degrees to the other pins and solder one end of the three lengths of wire onto it. The other end of the wire should be soldered to the centre (common) pin of the switch. Next, solder one end of the second piece of wire to the upper side part of pin 30, taking care not to bend the pin or to get solder on the flat lower part. The other end of the wire should be soldered to either of the two remaining pins of the switch. The third length of wire must be soldered between the remaining pin on the switch and the socket which pin 32 normally fits into. If on your Dragon, like mine, the vdg chip is soldered directly to the board, pin 32 should either be de-soldered (using bread or a pump from the underside of the board) and carefully pulled back through the board, or cut with a pair of side-cutters as close to the board as possible.

If it was removed, the vdg chip can now be refitted, taking care that pin 32 does not make contact with the wire now soldered in its place. Fit the switch to the case in the drilled hole and reassemble the case. Reconnect the power supply, momentarily test and switch-on. Don't worry if the display is normal, operate the new switch and see what happens!

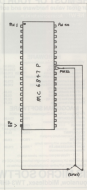
## Net Ascll

A (second) trade-off is that because the cursor is not an Alpha ascll character, it does not invert. Instead, it becomes a flashing black graphics block on a black background - somewhat difficult to see!

Nonetheless, these apparent problems can be overcome. The essence of this modification is that it is switchable - even during the running of a program, so that if confusion exists, simply by switching back to normal video, the display instantly returns to the original format. Moreover, the problem of the 'missing' cursor can be overcome by replacing the graphics block with a hyphen or other Alpha character using the routine published in OJ a while ago (OJ - how about reprinting the item referred to?) (at the time of writing I still haven't managed to identify it - GJ).

The advantages of using this method is active inverted display are considerable when it is considered how much basic programming is required to achieve inverted spaces and punctuation marks in print statements!

Here then, are the instructions for carrying out the mod which requires only the careful use of a soldering iron, preferably low wattage with a miniature tip, a drill for making the hole in the case in which to fit



## Ten minutes

The next invention will in no way affect the computer's operation, or necessitate any program changes, but if like me you are tired of that black-on-green display, it makes a refreshing change! Even if you are not a wizard with the soldering iron, provided you are careful not to use too much solder, you should have no problems and the results are still worth the 10 minutes or so to do the modification and the cost, which is only a few pence.

Although this mod has been tried and tested, as usual, the author and Dragon User can accept no responsibility for any problems arising from the modification. We also suggest that you don't attempt a modification, even a simple one, inside your computer unless you are experienced at construction.)

# Expert's Arcade Arena

Write to: 'The Expert' at Dragon User  
12-13 Little Newport St  
London WC2N 6PP.

HELLO and welcome. It's time to start this month's column with *whereby POKÉ* which makes all games load four times as fast, operate with infinite lives and play that national anthem. Unfortunately I can't. But I've got lots of other goodies for you instead, including the first of the answers to the questions which I set in January. Please keep your letters coming in, especially those entries in the software survey. At present, *Deathstalker* and *Armenia's Revenge* are the hottest contenders for the all time best arcade game, and *Ed Scio* has received over 75% of the votes and looks like winning the title of best programmer. Thanks, as dear father would say, unless you know better!

And so to business. As promised, *hereby* some more from the one and only James Bonfield. Mr. Goodwoodcon provides us with a new POKÉ for *Pitfall* from Pocket Money.

## Pitfall cheat

Load the game using program C (see Dragon User September 1987) coupled with (X)change.maz.

30-POKE792 LxPOKE792:z where z is a number 0-255 (offset 3)

Unfortunately, I'm having a bit of trouble with this one. As

James himself said, "it's a dodgy experiment". And now for another game unrelated from James, the final messages in *Copie Smash* that a good questioner, 'let he play the game to get them'. Over to you, James.

"In *Copie Smash*, when you land on the last platform, the screen displays:

RETURN TO HQ TO  
COMPLETE MISSION

On returning, the final message is:

MISSION COMPLETED

He also says that while this is displayed, the computer plays a tune and 'springs things fly around the screen', but if you ask me it's only a little recognition for such a mammoth effort needed to complete the game!

James said that a few maps, the *disappearing* map being particularly interesting, but unfortunately we weren't able to print it. I've listed below a few points to remember if you draw a map and would like us to consider printing it. No more *Copie Smash* maps please!

1. Always use plain paper. If you need squares then use a sheet of graph paper or squared paper underneath your plan and it will show through.
2. Always use a black pen, and

preferably not something which bleeds, smudges, or goes (unless Colours won't show up.

3. Try to ensure that lettering and details are really clear.

4. Maps should be large enough to be clear but preferably no larger than A4, and lettering should be of a readable size.

These instructions should enable us to bring your efforts to the world if the opportunity arises.

And now for 'lots' *Eclipse* time (see up Joe Brimcat, are you receiving me?). Two loyal servants, Peter Macmillan and David Linsley, have replied to question 2 of January's plebs, and I am pleased to announce that Universe it does in fact exist. Peter informs me that it's a crazy world in which you trade in *Chalk Dust*, *Blue Socks*, *Fog* and *Rangersons*. (What? I can't read.)

He also offers a helping hand to those who have Universe II and want to know how to play it — he thinks people are in such a situation, but I don't know why!

Thank you Peter and David. But the way David, I'm not any of the people you suggested, especially Kenny Everett.

AND NOW THIS ... I must give you a *Wizards Quest* POKÉ, so no-one else sends it in. I've had so many people send it to me that I've forgotten both their names (years). To

give credit where credit is due, thank you Tom Wilkinson, James Bonfield, Michael Dunn and Sean Hoare.

## Wizards Quest cheat

Load using program C, coupled with:

20-POKE26494:30

This gives infinite lives.

And now, with most of the official business out of the way, you and I must have a serious talk. Sit down and pull your Dragon User up closer because I want a private word.

Now, I don't ask much of you folks, so you could at least grant me this one, tiny request. NO MORE CLEVER PEN NAMES PLEASE! Yes, you, I refer to you, of course, *Geddy the Incredible Games Playing Godfather*. I don't want to be hearing any more from you under this name as I feel very angry and disbelieve your camp pen name, so on your plea! For those interested, this fella fellow, who sent me a most unusual letter, is in fact Simon Harrison, so now that you know his real name you'll never take him seriously again!

Well again I've reached the end of another page, so I must sign off. Keep your letters coming in, and lend your eyes next month for some help of *Catecomb* Cate.

# Communication

**Problem:** I am finding difficulty in obtaining floating joysticks.  
**Name:** Scott Hadden  
**Address:** 336, Clancy Place, Glenrothes, Fife KY7 4QZ

**Problem:** Need a printer cable to link P40 printer/paper.  
**Name:** Duncan Chambers  
**Address:** 30 Park Avenue, South Shields, Tyne & Wear

**Problem:** I need an Edi Plus cartridge for Dragon 32/64.  
**Name:** W A Slater  
**Address:** 44 Hopeside, Grimsport, Chesterfield, Derbyshire S40 1DG

**Problem:** Wanted: one Dragon controller for an unemployed person. Offered for a youth club — joystick in

any condition for the Dragon. Can repair if broken.  
**Name:** Dennis Gates  
**Address:** 184, Red Road, Neville Hall Estate, Durham

**Problem:** I am looking for an original copy of *Arise* as supplied by Datacom. I will pay £4.00 for it.  
**Name:** P MacMillan  
**Address:** Rose Cottage, Caxwood Road, Basing, Nr. Oxford, Oxon. OX18 8JG

**Problem:** Wanted: disc based word processor, *Writer* or *Buddy* (Simpel, suitable for Dragon 32). Write to me.  
**Name:** Andy Fell  
**Address:** 21 Gorse Farm Road, Thornhill Park, Mutton-Croft RH1 8TH

# Communication

Write down your problem on the coupon below (make it as brief and legible as possible) together with your name and address and send it to: **Communication**, 12/13 Little Newport Street, London WC2N 6PP

**Problem** .....

.....

.....

.....

.....

**Name** .....

**Address** .....

.....

.....

.....

.....



15 READ TO FILE

```

>=0-POS DOWN SPACE IN=0 INPUT
CIR
DOWN SUPP 15-17-18-19
END

```

PROCESSING AND M - - YOUR TALK J.

PLAYER NEED PULL AWAY ELS...

# Dragon Comms

Martyn Armitage introduces communication for the Dragon

SO, you've got a Dragon 64 and the only socket that you've probably never used is the unmarked 9 Serial 1/5, the RS232C interface to give it its real title. There are two main uses for the interface. 1) for connecting a serial printer, and 2) for connecting a modem. Most of what is said in this article will be regarding the use of the port as a communications interface, along with a modem, but most of what written will also hold true for the connection of a printer. To start off with I shall attempt to put into layman's English some of the most commonly used jargon that is associated with the RS232C interface, such as parity, baud etc. First we'll start off with protocol, which itself can, and will, be split into sections.

## Setting standards

Protocol can best be described as communications 'etiquette', and is simply a set of standards that one should adhere to if you wish to get anything other than garbage on the screen (paper if you're using a printer). As I have already said, I am going to break this heading down into the various parts that it consists of.

**PARITY** is a very simple method of error detection on repeated data. When in the communications world you will hear the phrases 'odd parity' and even 'even parity' quite regularly, and just as often you will hear 'no parity'. Just what is parity and how does it work? As you will know, a byte is made up of eight bits, each bit being either a 0 or a 1. Parity works by counting the number of set bits (1s) in a byte of data, and either setting or clearing the 'parity bit' in the transmitted data. Odd parity sets the parity bit to make the number of set bits 'odd'. For example, if we were to transmit the character A, its bit pattern is 01000001, and as you can see there are an even number of set bits, (3). So with odd parity the parity bit would be set to make an odd number, (4), if there is already an odd number of set bits then the parity bit is left clear.

The same thing still happens under even parity, except that the parity bit is used to make an 'even' number of set bits. The error detection works in this way: when data is received, the set bits are counted, if it is found that there is an even number of set bits, and odd parity is in use, then obviously there is an error somewhere in the byte. There is no indication as to which bit or bits have been affected, only that there is an error. It can be seen from this, that parity checking used on its own is of very little use, and in fact the use of no parity, where no parity checking is done, is quite widely used.

## Mark/space

**MARK and SPACE** when we talk of bits within a byte we usually say that they are either set or clear. When talking in terms of communications a set bit is termed a mark, and a clear bit is given an term space.

**START/STOP BITS:** there are two types of transmission of data, synchronous and asynchronous. As the interface for the Dragon 64 is the 6551 Asynchronous Communications Interface Adapter, ACIA, for short, and is not capable of true synchronous transmission, I shall simply say that with synchronous methods, the two communicating computers are synchronised with each other and so once synchronised with each other there is no need to indicate where each byte of data starts or stops. A series of synchronisation bytes being transmitted at intervals, very much similar to the methods used for taping programs etc on tape. The 6551, being asynchronous, has to use other methods of determining the start and end of a data byte, this is done by the use of start and stop bits. A start is simply a bit that indicates the start of data. The start bit is transmitted as a mark, then come the data bytes, which are obviously mark or space depending on the bit being transmitted. They are then followed by the stop bits, which like the start bit is transmitted the mark. As you can see an eight bit byte, when transmitted by the 6551 asynchronous interface adapter is at least ten bits long. Depending upon the protocol being used either one or two stop bits are used.

**BAUD RATE:** the baud rate is a measure of speed of transmission, and can be translated to 'bit per second'. For example 300 baud can be regarded as 300 data per second, or 300 bytes per second (300B/s = 300). This figure of 300 bytes is of course assuming the transmission of 8 bits per byte, but as I have said above we are transmitting at the least 10 bits per byte, and so 300 baud becomes 30 bytes/characters per second (30B/s = 30).

**SPLIT BAUD RATE:** a split baud rate is a way of saving transmitting and receiving data at different speeds. The standard split baud rate is 1200/50 and 75/1500. The first number is the speed that the receiver is working at and the second is the speed that the transmitter is working at. In the first case the data is received at 1200 baud and transmitted at 75 baud, the second case is the opposite, receive at 75 baud and transmit at 1200 baud.

**FULL/HALF DUPLEX** full duplex describes the ability of the ACIA to communicate in both directions at the same time, whereas half duplex describes the ability to transmit and receive but at the same time. When using the half duplex method it is necessary for each machine to let the other know when it has finished sending and is ready to receive. This is very much like two people communicating over a two way radio, and having to say 'over' etc. Full duplex is like a telephone conversation, each can talk at the same time.

## Internal checks

That just about covers most of the most commonly used phrases and terms. The user of the 6551 should realise that all the parity checking, addition and subtraction of start and stop bits is carried out internally by the chip and any errors are indicated by the flags in the status register of the chip. The 6551 is provided to the user in the same condition as when transmitted, unless of course an error has occurred, in which case the data could be just about anything.

The RS232C interface does not operate on TTL levels (0V to 5V) for signalling but instead uses voltage levels between -25 volt and +25 volt. The Drogos interface uses what appears to be the norm, namely -25V to +25V. One other thing with the RS232C interface is that on the data lines a voltage level of between -3V and +3V represents a 0, 0V and -3V to -25V represents a 1 (1), with the opposite being true for the control lines.

The computer is given the term Data Terminal Equipment (DTE) and the modem is given the name Data Communications Equipment, or DCE for short.

Now onto the Dragos RS232C port. You probably won't be surprised when I say this but the Dragos serial port looks as though it was designed into the machine, the user being provided with two of the five possible control lines available. However, the control lines provided do allow the interface to be used in a satisfactory manner. There are seven connections available, they are: 1) TX, 2) GND, 3) DTR, 4) RX, 5) CTS, 6) +5V, 7) -12V. Lets go into a little bit of detail.

**TX** is the abbreviation for transmit, all the data being sent by the Dragon leaves on this pin.

**GND** is the ground pin and is used as a return for all of the signal lines. **RX** is the receive data pin. Here all the data comes in to the Dragos. **DTR**, which is short for Data Terminal Ready, is the line used by the computer (DTE) to indicate to the modem



(DCE) that it is Ready and in a state to receive data. Most all cards use the CTS (Clear to Send) pin. This line used by the modem to indicate to the computer that it is in a condition to receive data, and then send it outside to the telephone line. It is essential that this line is connected on the Dragon otherwise you will find transmission impossible although you will be able to receive data.

## Connection

The last two pins, +12V and -12V, are provided in order to drive the control lines if it is, and are not capable of providing power sources for any other use.

**CONNECTED TO A MODEM:** of the five lines that the serial port provides the least number that we can get away with connecting is three. They are TX, RX, and GND, if you insist then you should be saying 'But what about CTS?' It's impossible to transmit without that connected! Well noticed, yes we do have to connect to CTS, but we can fool the Dragon. There are two methods open to us; 1, we can connect the -12V pin to CTS, which will then inform the 6551 that it is always clear to send, or we can connect GTH to CTS, which will inform the 6551 that it is clear to send when ever the GTH line is low, ie whenever the Dragon is on line. The link between the pins should

be made inside the 7 pin plug that is on the end of your modem cable, and not inside the Dragon itself. When connecting to the modem it should be realised that the TX and RX connections should be reversed, that is the TX of the Dragon should be connected to the RX of the modem, and the RX of the Dragon should be connected to the TX of the modem. The 6551 pins should be connected to each other. The above is the minimum connections that we can make, if your modem has extra control lines then it makes sense to make use of them. I shall illustrate all of the connections possible from the Dragon's port.

Dragon	Modem	Modem	Modem
GND	GND		
TX	RX		
RX	TX		
GTH	DTR	RTS	
CTS	CTS	DSR	DCD

The connections in the first two columns are the recommended ones but some modems, like the Dragon, do not possess all of the connections possible under the RS232C interface standards, and so the connections in the third and fourth columns are alternatives if the previous option isn't available.

**GETTING ON LINE** is the final stage. We've connected the Dragon to the

modem, the modem connected to the phone line, what next? Well before doing anything we must make sure that we are set up using the same protocol as the computer that we are going to call. Most Bulletin Boards (BBS) use 300/300 baud (transmit and receive at 300 baud), 8 start bit, seven data bits, even parity, 1 stopbit, using the protocol should give you some measure of success in most cases. On the increase is the use of 1200/1200 baud rate, this is receiving data at 1200 baud and transmitting data at 75 baud. The 6551 as used on the Dragon is not capable of working full duplex at split baud rates, but it is possible all the same, to access computers running at split baud rates, for example Provat.

## Conclusion

The above is a very basic introduction to what is a very interesting subject, many books have been written about communications, although none of them, to my knowledge, specific to the Dragon, if there is enough demand and the editor is in agreement, then I shall attempt to write further articles which will go into more detail, and possibly develop onto programming the 6551 (in machine code) so that you could write your own personal communications package.

## Adventure Contact

To help passed adventurers further, we are publishing an Adventure Helpline — simply fill in the coupon below, stating the basis of the adventure, your problem and your name and address, and send it to Dragon User Adventure Helpline, 62/63 Little Newport Street, London WC2E 8PP. As soon as enough entries have arrived, we will start printing them in the magazine.

Don't worry — you'll still have Adventure Troughs left to fill!

Adventure .....  
 Problem .....  
 Name .....  
 Address .....

IF any reader does have serious delivery/non delivery problems with any supplier, whether or not they advertise in DU, we would like to know. Only rarely can we do anything to improve a genuinely dodgy situation (which fortunately are rare) but it helps us to build up a profile and identify any long-term problems. Come to think of it, that includes Dragon Users, as, naturally, we want to know about any bottle-necks as early as possible. Apologies in advance for not acknowledging every letter, but where we can be of practical help, we will.

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# Winners and Losers

Every month  
Gordon Lee will  
look at some prize program winning

In January's *Dragon User* I gave my solution to the October competition problem. This was to find certain integers which belong to more than one class of the figurate numbers. To keep the solution as simple as possible, the listing that was given compares just two of the types of figurate numbers. In the example given, the comparison was between the square and triangular numbers. When this program is run, each matching value is printed in turn and the program can be stopped as soon as the required number of values has been found. The formulae used in lines 20 and 30 of last month's program are those which were in the table in October's issue. By amending one or both of these formulae between each run, all different required pairings can be compared. The actual method that the program uses, which involves a looping technique to prevent unnecessary duplication of calculation, was outline last month. This speeds up the execution time of the program.

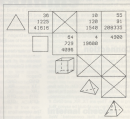
## Listings

I was therefore surprised at the length of some of the entries received — quite a number having a listing with

over a hundred program lines — too long to be reproduced here. In considering some of the shorter listings, I was surprised to find that some, when tested, failed to produce the solutions submitted with them!

## Function

However, one which did come up with the right answer is given here. It was from G. A. Newman of Addlestone, Surrey and is interesting in that it makes use of the function (FN) command of the *Dragon*. The five formulae which produce the triangular, square, cubic, tetrahedral and pyramidal numbers are initially defined in lines 10 and 20. To perform any of these calculations subsequently in the program it is simply necessary to use a line such as  $X=FNT(45)$ , which, if  $M$  is at that moment, say, 5 will compute  $X$  as 45 — the 5th triangular number. The advantage of using the FN command is that it can be used repeatedly in different parts of the program without the need to type in the generating formulae more than once. In the case of particularly complex formulae this can prove quite an advantage, and will also help to minimise errors! In G. A. Newman's listing the pairs of figurate required at each



Austin Henderson's solution, using a Tandy 800-115 printer.

stage of the computation are calculated, using the FN command, in the subroutine at lines 30 to 80. In lines 90 and 100 is a double-selection of FN, THFN and ELFN. Normally I would not recommend the use of more than one set of these commands in a single program line unless you fully understand the logic which the computer uses in interpreting these lines (in the same way that a too liberal use of ANDs and ORs can also produce confusing results).

A number of other readers also included a printer routine in their programs to reproduce the grid arrangement for the judges. Thanks to Mike Lidgden of Walsley, Swindon, and Ramo Longshore of Chesterfield, USA, who were among the winners who presented their solutions graphically. Special mention must also be made of Austin Henderson of Beaconsfield for a very neat piece of graphics produced using an inexpensive Tandy 800-115 printer.

```
10 CLS: DIM R(5,3): DEF FNT(X)=X*(X+1)/2: DEF FNSQ(X)=X*X: DEF FNCU(X)=X*X*X: PL=1
20 DEF FNT(X)=X*(X+1)*(X+2)/6: DEF FNPY(X)=X*(X+1)*(2*X+1)/6: GOTO 90
30 X=FNT(R(1,Y)):Y=FNSQ(R(1,X)):RETURN
40 X=FNT(R(1,Y)):Y=FNT(R(1,X)):RETURN
50 X=FNT(R(1,Y)):Y=FNPY(R(1,X)):RETURN
60 X=FNSQ(R(1,Y)):Y=FNSQ(R(1,X)):RETURN
70 X=FNSQ(R(1,Y)):Y=FNT(R(1,X)):RETURN
80 X=FNSQ(R(1,Y)):Y=FNPY(R(1,X)):RETURN
90 T=2:N=2:N=2:PL=PL+1: IF PL=6 THEN GOTO 150 ELSE IF PL=4 THEN F=1 EL
  SE IF PL=5 THEN F=2 ELSE F=0
100 ON PL+1 GOSUB 30,40,50,60,70,80
110 IF X=Y THEN R(PL,T)=X:GOTO 140
120 IF X<Y THEN N=N+1 ELSE N=N+1
130 GOTO 100
140 IF T=F THEN GOTO 90 ELSE T=T-1:N=N+1:GOTO 100
150 FOR I=0 TO 5: IF I<1 THEN K=0:U=1 ELSE IF I<3 THEN K=0:U=1+I ELSE
  K=4:U=1+2
160 FOR J=0 TO 2:V=2-J: IF R(I,V)<0 THEN PRINT$(K+(J+K)*7+U),R(I,V)
170 NEXT J, I:PRINT$400
```

G. A. Newman's program uses the function command.



CLUBH? panic at once! Fortunately he leaves his master file complete with numerous Dragon adventure solutions, but panic over as it is relieved from beneath two copies of Dragon User, two programming utilities with manuals the size of telephone directories, and a Spanish edition of one of my books. I must sort out this filing system of mine some day.

A belated thank you to the people who sent me Christmas cards via Dragon User — oh, I didn't know you cared! A special thank you to Joe Binkard, our noted correspondent from Malta, who sent me not only a Christmas card but a postal order for one pound so I could buy myself a drink. What a star I must point out, by the way, that when I gave Joe's address last time I got things slightly wrong. The full address is 75-Ammiration Street, Hamms, Malta. What I printed as the post code last time was, in fact, the date! Flashy guy, stayed with, apparently all the people who write to Joe. I pass on his thanks! included that as the post code, much to the amusement of Joe and his postman.

It seems that many of you write to him, exchanging addresses and giving details of many games and utilities. Some, it seems, had well over 200 letters on offer. Well done chess and chesspox, keep up the good work.

Keeping briefly on the foreign side of things, Ole Ekoy (who can be found at Stokken, N-5410 Sagvåg, Norway — postcodes/zipcodes confused with decimal times) asks me to tell you that he runs a Norwegian Dragon magazine, and that he can get help for the following adventures: *Blaze Samuels*, *Coloss Island*, *Castle of Doom*, *Caverns of Doom*, *Circus Adventure*, *Don't Panic*, *Dragon Mountain*, *Franklin's Tomb*, *Golden Baton* (easy-peasy), solved it myself in one afternoon!, *Juddaboston*, *Mission Adventure*, *Master of Doom* (lord of Doom, these adventure writers, *Resigner's Diary*, *Stone Adventure*, *Patron of the Ring*, *King of Darkness* (past night), *Sea Quest*, *Shogunspans*, *The Art Trilogy*, *Time Machine*, *Unleashed*, and finally the horror *Alphas*. If you have a few exotic stamps, drop him a line.

Micks letter from pils, tells out that it's from Sean Meale in Wakefield, who says that I write a superb column. Well is this

man, get his query answered immediately. It's an old friend, is *Spyguy* and I've got yet another letter here from one Steven Mead in Essex — we shall be returning to this chap later! about the same problem in the same game. It's all to do with entering these co-ordinates in which you shoot all over the place once you've got to the transporter Wall, as we'll should know by now, the co-ordinates for the various places that you want to get to are:

Planet 3-4-1-5  
Planet 2-3-0-0  
Wader 1-6-5-5

Read this carefully. Sean and Steven, for each place, enter each number by pressing that number, and at the end of the row (after the fourth number has been entered in other words) you must **PULL LEVER**. And away you go. I thought nobody would ever have problems with *Spyguy* ever again, but it just goes to prove that this extremely popular adventure for the Dragons still manages to confuse people. The sign of a good game, I suppose.

Problems with *Beginners* for Andrew Lamb, in Hazel Grove, Stockport, Cheshire. An address that should be familiar to a few of you... but I shall say no more, otherwise must be obvious would probably be in this column if I mentioned another publishing company. Any road up, as they say, he's having problems getting the archangeal, despite (and I quote) many, many hours of trying. Well, actually it's the magic first sheet, the part that deals with the collecting of the archangeal, made as follows:

"Goed Bruce into Deard! Dive and press the button to reveal the life. Bring him out via the northern entrance, Deard Fighther in through the northern entrance and down on the life to get the whiskers. Bring him out via either the northern or southern exit and transfer the whiskers to Goliath. Get Goliath to wear the whiskers. To complete Deard! Dive, send Goliath in, down on the life and ladder and get the archangeal from the lowest machine and give the archangeal to Bearching. This is hard to complete without getting caught, so use the HOLD and QUIT commands."

There, let's hope that's sorted that par-

lousie problem. A little bit further on in the game, Andrew tells us that he can't get past the walled garden. I shall quote step number 11 in the solution:

"Send Goliath into the walled garden carrying the wand and Cast Spell then get the tool. He returns from the ride with the wand at daybreak. Use the wand to fish for the apses and give them to Fighther to wear."

That's all we need to know about *Beginners*! I think, so back to Stephen Mead and his many problems. All of them, I believe to add, are connected with adventure games. You don't want anyone to get the wrong idea...

Where should we start, Stephen? "See oh! tonight I'm in ghgghgh! It's too evil! I can't do it! I'm too old!" What? And for getting that, I win the lot. Anyway, let's take a look at *Unleashed* Again. When's the *Blaze Samuels* for winter in issue. On the garden planet, as last month's column will tell you. Where's the acid? North from the ship on 8250. Where's the (optional) thing to help you breathe on planet? So technical, a suit is the object in question I believe. Have we unlocked the cabinet? Have we opened the manual? Have we pressed the red button in the teleport room? Are we, in fact, wasting our time attempting to play adventures and should we do something marginally easier instead, like unfolding paper clips or sharpening pencils? Hee hee, sorry Stephen, couldn't resist a wee dig at someone. Where are other useful objects, he would like to be informed. Well, I can't tell you everything, now can I? Read last month's column in minute detail, it's all in there somewhere.

Antonio Juddaboston, where the question is akin to something out of *The Restaurant at the End of the Universe*, where's the space with which to dig in the loose earth just the door past the nightgays dead souls to get the Red/Cello One? "Our housewife is full of rats, and all that. And all that, what the must do is to bind the nightgays dead with your camera and take the speech from him. Where's the camera?" In the photo gallery. Where's the photo gallery? Go to the museum platform (don't enter endless red corridors), wait for the car and board it when the doors open. And if you can't find the museum platform then

you're going to have a hard job finishing the rest of it! No, once you've got past the highway-dread moments a loss and you should have time to worry about. I shall await your next letter. . .

Now this, my friends, is where we talk about something else, thanks to a letter from Paul Harrison in Singapore, anyone who's managed to make their way through Tolkien's *Rings* (or *the Silmarillion* without getting bored) is keen deserves a mention. Our local postcode guide is more interesting. (Rumor has it that a game based on *The Silmarillion* is under development, it will be played on a MAC clone, have no relation, and slide into the sea at the end. Much as I loved *The Hobbit* and *Lord of the Rings* I could never get on with *The Silmarillion* (I found a gem in it once and then realized it wasn't meant to be found). Surely like a spaced out heavy metal band to me, but there you go. [It is. I was up till 2am last night watching them, which may explain my present state of mind. What if you called Lord of the Rings meaning make up a new music genre? Sil! or cooos.])

Paul's information is a novel one: have a competition where someone sets up a site, and anyone with nothing better to do tries to make an adventure out of it. Okay, this month's title is: *David Peace* or *IT*.

Secondly, he goes on to say that he would like to write an adventure based on *The Silmarillion* and other such books and would like to know how to start going about it. Well, first of all there's a nasty little thing called *The Law of Copyright*. (I'll send a letter to it).

To take a specific but narrow (I hope) example, suppose that you'd just finished reading *The Price of Eggs* by Denis Dising, published by Trollbayer Press, and

wanted to turn that into an adventure game. Where to start?

The obvious place to start, and this is where a great many ideas fall straight away, is getting in touch with the author or the publishers, and those you'll have to find out who holds copyright on the book. Generally speaking anything that is written by someone who's been dead for over fifty years is going to be out of copyright and languishing freely in the public domain, but it's as well to find out first. In many instances, you'll find that copyright is passed on via the author's estate or someone else may have picked up on the copyright, and any attempt to publish a game that infringes upon that copyright will land you in very severe trouble. This can happen whether you sell a thousand copies or just hand a couple out to a few friends: the same rules apply.

To begin with, then, you must write to the publishers. Don't bother with the author at this stage. For one thing they might be dead, and for another they might have sold all copyright to the publishers when it was released. So write our case a letter to Trollbayer Press: is the place to start. Several things can then happen.

1) They have only published the British version of an American book, in which case you're in for a long correspondence with the original publishers, and the can also happen if it's a paperback edition of a book originally published in hardback, as quite often two different companies take charge of the same book. When you eventually reach the first publisher, we can go on to the next stage.

2) Somebody else has already done it, or is

in the process of doing it, so forget about it.

3) You'll have to get in touch with the author, as the publisher would pass on your letter to Denis Dising. I would take a dim view of any publishing house that released the home address of an author, and you'll just have to be prepared for a wait. In either case we reach the next stage.

4) If there is out copyright, so be ahead and write your game without infringing anything and, more importantly from your point of view, without having to pay any royalties to anyone. The ideal situation.

5) Yes it's okay but we want a royalty or some money up front. Your bank manager then determines whether or not you can write the game, and if this happens to be the case then I think you'd be well advised to give up on the idea and find something else to write about.

6) No it is not okay, it is completely out of the question, and don't even think about it. This quite possibly means that the publishers are doing themselves, or having someone you like think of a wonderful one but want a massive software house to do it. Oh well, nice try, but back to the library.

If you actually survive all these thummes and receive permission to write the game (whether you're paying anything or not, and I'd strongly advise, knowing that I'm repeating myself, not to take on a game that requires you to pay money to someone else), you're better off out of it, then what do you do?

Well I've run out of space, you'll just have to buy next month's *Dragon User*!

# Write: ADVENTURE

*Pete Gerrard discusses literary decorum and the joys of spring*

ONE word which has entered the adventure player's vocabulary lately, and which certainly wasn't seen in any of the early adventures, is the word 'fail'. People now frequently try and GET ALL or DROP ALL, whereas before they were content to get or drop things individually. This is part of the increasing power of the parser and the demand for more sophisticated games.

Anyone who has played, for example, *The Pawn*, on another computer, will know what I mean. From my own point of view I cannot see the point in having to type in the command 'fail the gold plant in the plant pot', however wonderful it may make the parser appear. In this case I'm sure it was only ever included so as to impress public reviewers, for the released pot plant is the plant pot to begin with! You have to take a cut, using a towel if I remember rightly, and then put it back in again, all this to score about 5 points. A complete and utter

waste of time, but Magazine Books try to boost about their parser, so there you go.

Again from my own point of view, however sophisticated the parser might be I still tend to play an adventure in verb-noun format, only occasionally using more words where a situation clearly requires it. Why on earth type *Climb the slippery rope* separating the stout gloves when you could just as easily have *Wear Gloves*, *Climb Rope* instead? Less typing, and less time for the program to have to work out what you mean. Perhaps I'm in a minority, but personally I think that a parser that understands four words is sufficient, and I absolutely dislike and detest adventures that insist that you (for example) go north quietly, or unless you carefully: if I was a real life situation rather than an adventure, if you had to go north quietly you WOULD go north quietly, you wouldn't mangle in like a wounded elephant, and I think that

programmers should accept that those things are implicit in the instructions given to the program. An adventure should be about solving problems, not working your way through Magazine's Theismos in a vain attempt to find the correct word.

What's brought all this on, you might be wondering. Hangover? No. Sound blushing in last night's pool league match? No. It was a quote written by a friend of mine, which read that a definition of frustration was spending three months typing "Say 'give life with this my lovely blade'" near the end of an adventure only to find (quite by accident) that the correct input is "shoot gentle with this my trusty blade". That sort of thing should never happen, so keep it out of your own adventures, all?

However, I can appreciate the usefulness of the word ALL. Not only does it save time, it can also be a useful aid to

solving the adventure, if you go around typing GET ALL everywhere and seeing what the responses are. The first time I tried to implement such a routine in an adventure I gave up, thinking that it was incredibly difficult and nobody would ever want to use it anyway. However, I tried again recently, and discovered that it wasn't quite as difficult as I thought. We'll look at GET next month, perhaps, but this month we'll concentrate on DROP. This is mainly because it's the easier one of the two to understand and program!

We won't be going any further than GET or DROP though. Even the mighty wizards don't have GO ANYWHERE ALL, for instance, in their mighty 1001 16-bit adventures. Mind you, they do have FLY the object, probably the most wonderful character ever created in any adventure anywhere. Beg, borrow or steal the chance to play Planescape and the even better follow-up Dragonfall. The creation of Floyd was a work of genius, and whoever thought of him first deserves an adventuresome medal. Quake of laughter one minute, then silent tears at the end of Dragonfall. A truly memorable character, and quite, quite real and believable.

If you look at the listing headed **Figure one** you will see a fairly conventional DROP routine from one of my adventures, and in order to understand it I'd better explain what a lot of the variables are.

Lines 2550 and 2551 concern themselves with object number 61, a dog. They was a different kind of conventional idea, because the dog is in fact a guide dog, and without him you cannot get through the blackness of the cave section of the game. It makes a change from wandering around trying to find a lamp and some batteries, a situation I am somewhat tired of seeing. If you're dropping the dog then tell the player so, and if he's not carrying object number 11 in the correct manner (a variable in a box, to stop the wind blowing it out) then the variable 'c' is set to 2000, indicating light off.

Line 2552 sorts out the words and nouns by going to line 2554 if the word has been typed in. The player might have typed DROP BOX OR FLOOR, which we just interpret as DROP BOX after lines 2568 and 2569 have had their say. Line 2554 (and

2568 for that matter) carries objects numbers 24 and 26, which are the same thing. If they're a pair of tennis rackets, and you've entered TENNIS and noun 26 is the word RACKETS, just in case the player decides to DROP TENNIS instead of DROP RACKETS. A case of convenience for the player rather than the programmer.

Line 2556 checks to see whether the player is carrying the object in question, and if not issues the message number 163 as pointed out courtesy of a referee at line 2565. This is just something to the effect that you can't drop something that you haven't got.

The rackets are meant to be worn, like whistles, and if the player is dropping the rackets then the 'rackets worn' variable 'w' is set to zero by line 2558.

Assuming that the object to be dropped isn't object number 42 (the number is mere coincidence, I assure you, and nothing to do with the making of life) then line 2560 sorts everything out by placing the object in the current location and informing the player that he has, in fact, dropped it.

Lines 2562, 2564 and 2570 are all designed with object number 42 in mind, and object 42 is in fact a tightly coiled spring. Reasonably enough, dropping such an object causes it to bounce away from you, so we use the current position variable 'cp' to determine the new position ('np') of the spring after it's finished its bouncing. Then we put the spring in its new position and, as with all the 'drop' routines, decrement the counter that keeps track of how many objects the player is carrying. This, for some obscure historical reason that now escapes me, is the variable.

That was the conventional drop routine, so how might we go about testing it around so that we can understand DROP ALL, as well as DROP OBJECT? Well, if you look at the listing in **Figure two** you'll see (and are wary of doing it. If you think about it, we're only really concerned with these objects, namely objects numbers 26, 42, and 61. The rest can be dropped with wild abandon, but dropping those three causes something to happen, so as long as we keep that in mind we should be all right.

Assuming a healthy bit of line number-

ing, we could have a new line 2553 that checks for 'tennis' and if it's present, then mangle of noun new routine starting at line 2568. Then, with 'ten' being the variable that tells us how many objects there are in total, we set up a loop to scan for every object in turn. First of all, in line 2562, we look for the dog being present, and if it is then proceed as before and tell the player that it's been left behind. Again, if he's not carrying the candle in the box then the logical variable 'fo' must be set to zero.

In line 2564 we look for the tennis rackets, and if they're being carried then we have to set the 'rackets worn' variable 'w' to zero.

Assumes, as usual, three lines (or four for the spring, and there are now 2555, 2556 and 2567) before we'll do anything, found out the current position from 'cp' and determine the new position 'np' of the spring from that, and print out the 'Bouncegggg!' message to inform the player that something's happened to the spring. Incidentally, one of the more annoying features when testing the program that these listings came from was the spring, for I had included a routine that made it automatically hop away from you every ten moves, regardless of whether you had dropped it or not. I spent ages chasing the thing all over the game, and just when I thought I'd caught up with it after solving a problem or two it would hop away again. It might only be moving two locations at a time, but those two locations are not necessarily anywhere near each other!

Line 2567 checks to see whether an 'ordinary' object is in the player's possession, and if it is then just it to the floor (a byte player what's been dropped before continuing around the loop with the NEXT statement in line 2568. Line 2568 then sends us back to the main part of the program, and you might care to expand on this section of the program slightly so that it would cater for an input of DROP ALL when the player wasn't actually carrying anything. Perhaps I think too highly of players, and neither of my testers found it, but someone, somewhere, would no doubt type it in!

So, DROP ALL, wasn't too difficult, and we'll take a look at a GET ALL routine next month. Bye for now.

**Figure one**

```
2550 IF nm=61 AND ob(61)=1 THEN PRINT "
you leave the dog." : ob(61)=cp : ss=ss-1 : IF
ob(11)=3 THEN 1=0 : GOTO 16
2551 IF nm=61 AND ob(61)=cp THEN 16
2552 IF 1=0 THEN 2566
2553 IF nm=24 THEN nm=26
2554 IF ob(11)=3 THEN ss=ss+1 : GOTO 50
50
2555 IF nm=26 THEN nm=6
2556 IF 1=0 AND nm=6 AND ss<43 THEN PR
INT "Okay, " : ob(11)=1 : dropped="ob(11)=
cp : nm=1 : GOTO 16
2557 IF nm=42 AND op(16) THEN ss=ss+3 : GOT
O 2576
2558 IF nm=42 THEN ss=ss-3 : GOTO 2576
2559 ss=11-12 : IF ss=24 THEN ss=35
2560 11=0 : ss=0 : GOTO 2556
2576 PRINT "Bouncegggg!" : ob(11)=cp : ss=ss
+1 : GOTO 16
```

**Figure two**

```
2553 IF nm="all" THEN 2568
2554 FOR 1=1 TO ss
2555 IF 1=61 AND ob(61)=1 THEN PRINT "r
ackets worn the dog." : ob(61)=cp : ss=ss-1 : IF
ob(11)=3 THEN 1=0 : GOTO 2568
2556 IF 1=26 AND ob(26)=1 THEN nm=6 : GOT
O 2567
2557 IF 1=42 AND ob(42)=1 THEN PRINT "B
ouncegggg!" : IF ob(16) THEN ss=ss+3 : GOTO
2568
2558 IF 1=42 AND ob(42)=1 AND op(17) THE
N ss=ss-3 : GOTO 2568
2559 IF ob(11)=1 THEN PRINT "Okay, " : ob(
11)=1 : dropped="ob(11)=cp : ss=ss+1
2560 NEXT
2561 GOTO 16
2562 ob(42)=cp : ss=ss+1 : GOTO 2555
```

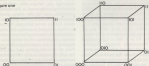
# From Gray to black and white

Gordon Lee and Graham Barber try to harness Gray codes

A bonus for completing the competition takes the form of letters (mostly complimentary) which readers include with their entries. One such comes from Graham Barber of Sutton Coldfield, who writes:

"Enclosed is an idea for the Competition Page. During the past 26 months or so I've had so much pleasure and interest from DU (especially the competition) that I thought it time to put something back, and then being called a 'stakeout' in this June issue stirred me into action so you could say this is a 'Stakeout's revenge'."

Figure one



Graham's competition problem is to devise a programming method which converts an input Gray code into its binary equivalent. But, I hear you ask, what is a 'Gray' code? (You can hear me in Birmingham — GJ.)

This, at its most elementary, is a system of counting in which consecutive numbers are obtained by changing one digit and one digit only at each stage, the difference in that digit being 1. They were first developed by Frank Gray, an American research physicist, and the codes now bear his name. Gray codes can be formulated for number systems in any base—for example, in the familiar decimal system an adjacent run of codes might be 475, 476, 477, 478, 479, etc. Note that there is no logical key to this sequence except

that only one digit differs at each step. Because of this it is necessary to introduce certain additional rules if a logical sequence of numbers is to be formed.

But what is the point of all this? Consider the practical application of reading, say, a gas meter. With a conventional mechanical readout device there is no real problem when the reading changes from 10556 to 10600 even though three of the 'wheels' change simultaneously. But consider the situation with high speed machinery where rapid sampling needs accurate split second monitoring. The

few squares, increasing the number of bits to three is equivalent to using the corners of a cube. Here the number of possible paths increases, as at each corner there is a choice of two possible routes. The only requirement is that the route chosen should take us to every corner once only. Starting at corner '000', it is quite easy to find a number of possible routes, all different from each other, but nevertheless all producing a series of codes which obey the basic requirement. Some of the routes are cyclic, ie ending on an adjacent corner to '000'; others are not. For most applications, a cyclic route is preferable. For each additional digit used in a sequence, the number of possible paths increases at an alarming rate. Using just four digits, there are 5762 different sets of codes of which 2568 are cyclic. However, we're getting a bit off the track!

To be of practical use it is therefore necessary to formulate some additional rules whereby each binary Gray code will bear a 1:1 relationship with a conventional binary number in this way: conversion from one code to the other (in either direction) is

fewer digits changing between two successive counts will reduce the possibility of errors. Any optical link between a mechanical device and an electronic counter is by means of an optical disc using on/off switching and hence a binary system, so we will confine our attention to the binary Gray code. This was first developed by Frank Gray in the 1930s to reduce errors in the transmission of signals by pulse code modulation.

At first sight it might appear difficult to rationalise a logical order for binary Gray codes. If we limit ourselves to just two bits we get the cyclic series 00, 01, 11, and 10. This can be represented diagrammatically by placing these four codes at the corners of a square (figure one). In this case each step in the sequence is forced, producing a single path (or its reverse) going around



Figure two: using a 2-bit code to mark disc sectors.

## Prize

If the Dragon is the Computer that Time Forgot, then Zetika is the land the Dragon remembered. Renowned this month by Donald Morrison, Zetika is the island paradise discovered by R & AJ Preston (currently slipping off to Malta to recharge their island-spotting batteries), which is invaded by hurricanes and volcanoes while you are in the presidential chair (Zetika, not Malta). 10 paradise islands for 10 lucky winners. Hurricanes optional.

## Rules

WHEN your virtual ceases to spin and your mind ceases to whirl, you may discover that your Dragon has produced an answer. Print it out, quickly add any notes

or words of advice you deem necessary, send it to us in an envelope marked **MANCH COMPETITION** at the usual address, on back and exit.

Oh yes, and don't forget the disclaimer: We want to know why you think that you deserve to be sent to a paradise island. We'll be trying the lines out on the boss, who's heard it all, so make it good!

## December winners

It seems that taking into black hole is good for the brain, because we had stacks of entries. The winners, who will get either a 2oz/4oz cup or a discount voucher from John Pott (Discount Software), are Ian Huggins of Caerphilly, Clive Scott of Ashford, R H Wiles of Bovingdon, Dave Lantier of Rutherford, D R Sharples of Mersynside,

Lee Simpson of Littleport, Felice Hill of Cranston Beaches, John Black of Adlestree, Paul Priestland of Lechlade, James Bonfield of Sandy, J Smallwood of Preston, Gail Foss of Denham, Denis O'Malley of Cambridge, M. Buxfield of Llanymyne, Neil Davidson of Ayr, Christopher James of Malta, Don Robertson of Epsom, E A Newman of Adlestree, J Smith of Telford and D R Greenwood of Ingleton.

Favourite disclaimer from Paul Priestland: "I fell into a black hole, and when I came out ... my Dragon User had actually arrived." This is an unreal universe we live in.

## Solution

This month's solution is opposite.

a simple matter. The table shows the first five Gray codes together with their binary and decimal equivalents. Figure two shows a diagrammatic representation of an optical disc based on these numbers, each sector of the disc differing by just one

bit from each of its neighbours. This is equivalent to the four bit series given in the table. Reading from the centre of the disc outwards a hole represents a 1 and a non-hole, a zero. A similar disc constructed using conventional binary code would not

work in the same way as these would be a difference in two of the bits when going from (decimals) 1 and 2, three bits between 3 and 4, and all four bits between 7 and 8.

This then is the basis of Graham Barber's competition question. Can you discover an easy method of converting from a binary Gray sequence to its equivalent standard (not BCD) binary number? Having done this, then adapt the algorithm into a computer program so that an input Gray code is converted and displayed. The wanted code should be capable of converting any code of any reasonable length.

Hint: A binary and its Gray code equivalent will contain the same number of bits.

As a test of your technique, Graham also asks you to give the binary equivalents of Gray codes 111111 and 1010101.

DEC	BINARY	GRAY	DEC	BINARY	GRAY
0	0000	0000	8	1000	1100
1	0001	0001	9	1001	1101
2	0010	0011	10	1010	1111
3	0011	0010	11	1011	1110
4	0100	0110	12	1100	1010
5	0101	0111	13	1101	1011
6	0110	0101	14	1110	1001
7	0111	0100	15	1111	1000
			6	0000	0000

## The Answer

**ANSWER:** The neat cuboid in the series is one with sides 182, 193 and 184 units in length. This produces 4,590,584 individual unit cubes of which 4,073,128 form the central unperforated core. These perforated blocks can be arranged into a perfect cube 54 units along each edge.

**SOLUTION:** Any cuboid 174n in dimensions will have a central inner core of  $n^3 - 2n^2 + 12n - 2$  (1-2). The difference between these two volumes will give the number of cubes in the single layer outer shell of the cuboid. These will be the cubes which bear paint on at least one of their faces.

In the listing 111 is the smallest edge of the cube (which must have a minimum size of 3 if there is to be any inner cubes). From this dimension  $n^3 - 2n^2 + 12n - 2$  are found. The corresponding dimensions of the inner cube are then

calculated in line 40. The two respective volumes  $V1$  and  $V2$  are then found, and their difference (line 60) results in the number of unit cubes in the outer shell. All we need to do now is to print out those series of values in which this difference (P) is a perfect cube.

If you are a regular reader of these competitions you will at once realise that this is not a straightforward task as the cube-root calculations on most microcs is a bit of a tin and miss affair! Unfortunately, due to the logarithmic method of calculation used by the micro, cube roots (and other powers) can be a tiny bit out. This normally does not show on displayed results as these are correct to the nine digit value which is printed on screen. However, the computer's internal registers hold the value to several more significant figures and there may be a slight inaccuracy.

This is Gordon Lee's own solution  
see page 26 for results

```

10 N1=1
20 V1=H1+1:L1=V1+1
30 V1=H1*V1*L1
40 H2=H1-1:V2=V1-1:L2=L1-1
50 V2=H2*V2*L2
60 P=V1-V2
70 C=P*(1/3)
80 D=INT(C):D=C+1
90 IF C^D=C*P OR D^D=D*P THEN 100
100 H1=H1+1:GOTO 20
1000 PRINT H1," "
1010 GOTO 100

```

For example, if a value is cubed and the cube root is calculated by the computer, the value that we would expect in a perfect world would be 1. Unfortunately the number that we do get is usually a minute fraction too high or too low. The program overcomes this by first finding the integral value of the number being tested. This integral value is too high or too low if it was too low. Lines 80 and 90 of the program

take these two values and find the cube of them by direct multiplication. If either of these values equals the number being tested then the result is printed out, as a perfect cube has been found. In the case of non-perfect cubes, neither value would be equal to the number under test.

This technique forms a much quicker alternative to merely testing by a succession of perfect cubes.

## Classified

**SONY CCP-100** high speed cassette to cassette (audio computer) duplicator. Duplicates three tapes (both sides) at a time. Four channels stereo, nearly new. £180.00. Includes delivery John Potts, Dean Farm Cottage, Kingsley, Bordon Hants GU26 5BR.

**DRAGON 32**, leads, books, database, spreadsheets, wordprocessor, utilities, HD port, 100 DMS2. Tel 0483 25578.

**DRAGON 84** 180 Double-HDD drive £120. Teachmaster tablet

etc. C3-6 games, business software. Tel 0844 2173 (Dorset).

**DRAGON 32** (plus DeltaDCS, two floppies, Dragon Users, tapes, cartridges, games, books, all leads and peripherals, £150-£160. 0981 240 580.

**DISC DRIVE** systems. At the lowest cost. Cambridges, CDS, Drives (new), from only £48, Semi-addressed envelopes and two (extra) 1/4 stamps to: Pro-Tech Systems Ltd, 28, Pelican Rd., Pinner Heath, Basingstoke.

### HERE'S MY CLASSIFIED AD.

(please write your copy in capitals on the lines below)


Name .....

Address .....

..... Tel .....

Classified rate: 15p per word.

Please cut out and send this form to: Classified Department, Dragon User, 12-13 Little Newport St, London WC2H 7PP.

# Dragon Answers

If you've got a technical question write to Brian Cudge.  
Please do not send a SASE as Brian cannot guarantee to  
answer individual inquiries.

## Black to green again

After back in July 1980, you published a program in *Popular Computing Weekly* to convert text screens to green on black. I've used this in my programs since then without any problems until now. The program I am writing uses the GET and PUT commands. No matter what I do the GET command causes a SN ERROR when used with the insert program.

K. Rutherford  
21 Baxter Avenue  
Newcastle-Upon-Tyne  
NE4 6QD



## I/O as input

Could you tell me the I/O address of the Dragon printer port and how to program it as input, rather than Output?

Richard Evans  
St Asaph  
Conwy

IOB are correct in assuming that the printer port is connected to a PIA. Its address is 1F902 for the data register and 1F903 for the control register. However, the 8 data lines are shared with the Dragon's keyboard and so it is not possible to use the port programmed as input. Instead you'll have to obtain one of the I/O ports available which plug into the cartridge socket.

The 'back' used to interrupt the CUS command at location 418-419 is shared by the GET command. However, my program did not take account of this and this is what causes the SN ERROR. The simple solution is to surround the GET command with the POKE S...

POKE 418,ST-BIT(CTN-76,5,4);  
POKE 418,0

## RAM and ROM

I had quite a response from the letter headed 'ROM can't be RAM' in the January 78 edition. As it seems to be quite animated in a cartridge based RAM extension for the Dragon 32 I'm in some information on how to build your own.

The nearest solution was sent in by Mr A N Martin at 43 Black Haydon Road, Selly Oak, Birmingham B29 6BE. It is on his circuit that I have based the following article. Thanks to other readers who also reply in suggestions.

For an 8K RAM pack you'll need

the following parts, all available from Maplin Electronics: (Ry 8000 524150 for equivalent: a 6264 DRAM chip, a 47mf capacitor electrolytic, and a 20 pin IC socket for the RAM chip. You'll also need a prototyping board with 40-way edge connector and plastic case (available from Compucentre). The code above C18.

The diagram shows the RAM chip and its pin connections. The numbers at the end of the lines refer to the Dragon edge connector pins. The smoothing capacitor is connected between +5V and Ground and the IC's line is tied high. All other connections are direct to the edge connector.

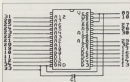
The Dragon's edge connector is numbered as follows - looking at it end on the left numbered pins 1,2,3 to 39 are above the board running right to left.

This is, perhaps not a project for those who don't know one end of a socketing iron from another. But providing you take reasonable care and test your circuits with an oscil-

loscope (before connecting to the power!) then it is relatively straightforward. Take special care with the RAM chip as DRAM chips sensitive to static 'back something earthed, ie a metal chair, before handling it.

The circuit does not decode the cartridge address space using AND 418, but rather uses the CTS (Cartridge address strobe) pin on the edge connector. This should be on the Dragon 32, but the Dragon 64 might require more rigorous address decoding.

PIN #	ADDRESS	DESCRIPTION
1	+12v	+12V Supply
2	+12v	+12V Supply
3	DATA	DATA Input to the CPU (convert)
4	DATA	Microprocessor Data CPU (convert)
5	DATA	Microprocessor Data CPU (convert)
6	DATA	Microprocessor Data CPU (convert)
7	DATA	Microprocessor Data CPU (convert)
8	DATA	Microprocessor Data CPU (convert)
9	DATA	Microprocessor Data CPU (convert)
10	DATA	Microprocessor Data CPU (convert)
11	DATA	Microprocessor Data CPU (convert)
12	DATA	Microprocessor Data CPU (convert)
13	DATA	Microprocessor Data CPU (convert)
14	DATA	Microprocessor Data CPU (convert)
15	DATA	Microprocessor Data CPU (convert)
16	DATA	Microprocessor Data CPU (convert)
17	DATA	Microprocessor Data CPU (convert)
18	DATA	Microprocessor Data CPU (convert)
19	DATA	Microprocessor Data CPU (convert)
20	DATA	Microprocessor Data CPU (convert)
21	DATA	Microprocessor Data CPU (convert)
22	DATA	Microprocessor Data CPU (convert)
23	DATA	Microprocessor Data CPU (convert)
24	DATA	Microprocessor Data CPU (convert)
25	DATA	Microprocessor Data CPU (convert)
26	DATA	Microprocessor Data CPU (convert)
27	DATA	Microprocessor Data CPU (convert)
28	DATA	Microprocessor Data CPU (convert)
29	DATA	Microprocessor Data CPU (convert)
30	DATA	Microprocessor Data CPU (convert)
31	DATA	Microprocessor Data CPU (convert)
32	DATA	Microprocessor Data CPU (convert)
33	DATA	Microprocessor Data CPU (convert)
34	DATA	Microprocessor Data CPU (convert)
35	DATA	Microprocessor Data CPU (convert)
36	DATA	Microprocessor Data CPU (convert)
37	DATA	Microprocessor Data CPU (convert)
38	DATA	Microprocessor Data CPU (convert)
39	DATA	Microprocessor Data CPU (convert)
40	DATA	Microprocessor Data CPU (convert)



6264 DRAM chip, Dragon 128K RAM cartridge ram.